

APPENDIX C – 2018 ANNUAL REPORT OF PTT GROUP



Annual Report 2018
PTT Public Company Limited

BALANCE AND SUSTAINABILITY





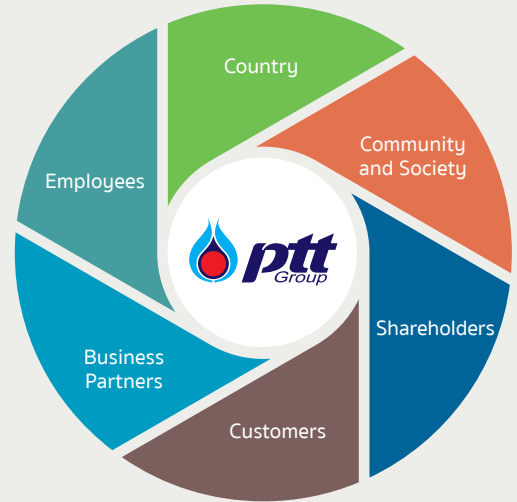
CONTENTS

002	PTT Information
003	Financial Highlights
006	Message from the Board of Directors
010	Report of the Audit Committee
014	Report of the Nominating Committee
016	Report of the Remuneration Committee
017	Report of the Corporate Governance Committee
020	Report of the Enterprise Risk Management Committee
022	Overview and Outlook of Economy, Petroleum and Petrochemical Industries
030	Nature of Business & Performance Summary
058	Extending Thai Energy Mission, Inspiration for Sustainability
076	Innovation for a Sustainable Future
084	PTT and Its Subsidiaries' Performance
101	PTT and Its Affiliates
102	Revenue Structure of PTT and Subsidiaries by Product Line
104	Connected Transactions
108	Review of Business Assets
109	Risk Factors
115	Capital Structure
120	Management Structure
150	Corporate Governance
198	Internal Control and Risk Management
204	PTT Board of Directors
218	PTT Executives
238	Awards of Thai Pride

PTT GROUP
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

PTT GROUP STRATEGIC
FRAMEWORK



To the country

Ensuring long-term energy security by providing sufficient high-quality energy supply at fair prices to support economic growth

To customers

Ensuring customer satisfaction and loyalty by delivering world-class quality products and services at fair prices

To community and society

Maintaining a good standing corporate status in Thai society by exercising environmental stewardship of internationally accepted standards and helping to improve the quality of life for community and society

To business partners

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

To employees

Promoting capability building professionally and ensuring employees' well-being is on the level with other leading companies

To shareholders

Operating profitable business that leads to sustainable growth while generating optimum returns

PTT GROUP VALUES



PTT Information

Name	PTT Public Company Limited	
Initial	PTT	
Registered Number	0107544000108	
Type of business	The company operates petroleum through investment in subsidiaries, joint ventures, and associates (PTT Group), which are engaged in upstream and downstream petroleum, coal, electricity business, and infrastructure business.	
Registered Capital	THB 28,562,996,250	
Issued and Fully Paid-up	THB 28,562,996,250	
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 Communication	Telephone: 66 (0) 2537-2150-1 E-mail: corporate@pttplc.com	Fax: 66 (0) 2537-2572, 0-2537-2171
Investor Relations	Telephone: 66 (0) 2537-3518-9 E-mail: ptt-ir@pttplc.com	Fax: 66 (0) 2537-3948
Office of the President and Corporate Secretary	Telephone: 66 (0) 2537-3885-6, (0) 2537-3855 E-mail: corporatesecretary@pttplc.com	Fax: 66 (0) 2537-3883, 66 (0) 2537-3887

References

- Securities Registrar**
 Thailand Securities Depository Company Limited
 1st floor, the Stock Exchange of Thailand Building, 93 Ratchadapisek Road, Dindaeng, Bangkok 10400, Thailand
 Telephone: 66 (0) 2009-9999
 Fax: 66 (0) 2009-9991
- Auditor**
 Office of the Auditor General
 Rama VI, Phayathai, Bangkok 10400, Thailand
 Telephone: 66 (0) 2271-8000
 Fax: 66 (0) 2618-5769
- Registrar**
 Siam Commercial Bank Public Company Limited
 Registration 1, Markets Operations Division, 15th floor, North Wing, G Tower Grand Rama IX, Huai Khwang, Bangkok, 10310
 Telephone: 66 (0) 128-2324-9
 Fax: 66 (0) 2128-4625
 Corporate Trust Sale, Corporate Trust,
 9th Ratchadapisek Road, Chatuchak, Bangkok 10900
 Telephone: 66 (0) 2544-3937,
 66 (0) 2544-2923
 Fax: 66 (0) 2544-7475



Financial Highlights

2016

2017

2018

Statement of Income	(THB million)			
Sales and Service Income		1,718,846	1,995,722	2,336,155
Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA)		312,526	345,395	351,396
Net Income (Loss)		94,609	135,180	119,684
Statement of Financial Position	(THB million)			
Total Assets		2,232,331	2,232,314	2,355,484
Total Liabilities		1,060,734	983,758	1,036,990
Non-controlling Interests		408,649	429,884	443,411
Total Equity Attributable to Owners of the Parent		762,948	818,672	875,084
Shares or Information about Common Shares				
Shares and Fully Paid-up Share Capital	(Million Shares)	28,563 ^{2/}	28,563 ^{2/}	28,563^{1/}
Book Value per Share	(THB)	26.71 ^{2/}	28.66 ^{2/}	30.64^{1/}
Earnings per Share	(THB)	3.27 ^{2/}	4.67 ^{2/}	4.15^{1/}
Dividend per Share	(THB)	1.60 ^{2/}	2.00 ^{2/}	2.00
Dividend Payout Ratio to Net Income	(%)	49.0	42.8	48.2
Share Price at the End of Financial Period	(THB)	37.20 ^{2/}	44.00 ^{2/}	46.00^{1/}
Financial Ratios				
Net Profit to Total Sales Revenue	(%)	7.54	9.25	7.08
Return on Equity	(%)	12.96	17.09	14.13
Return on Total Assets	(%)	5.88	8.27	7.21
Debt ^{3/} to Equity	(Times)	0.52	0.42	0.41
Net Debt ^{3/} to Equity	(Times)	0.19	0.11	0.08
Net Debt ^{3/} to EBITDA	(Times)	0.71	0.39	0.31
Interest Coverage	(Times)	9.23	11.01	11.13

Remarks:

1/ On April 24, 2018, PTT changed the par value of the Company's share from THB 10 per share to THB 1 per share.

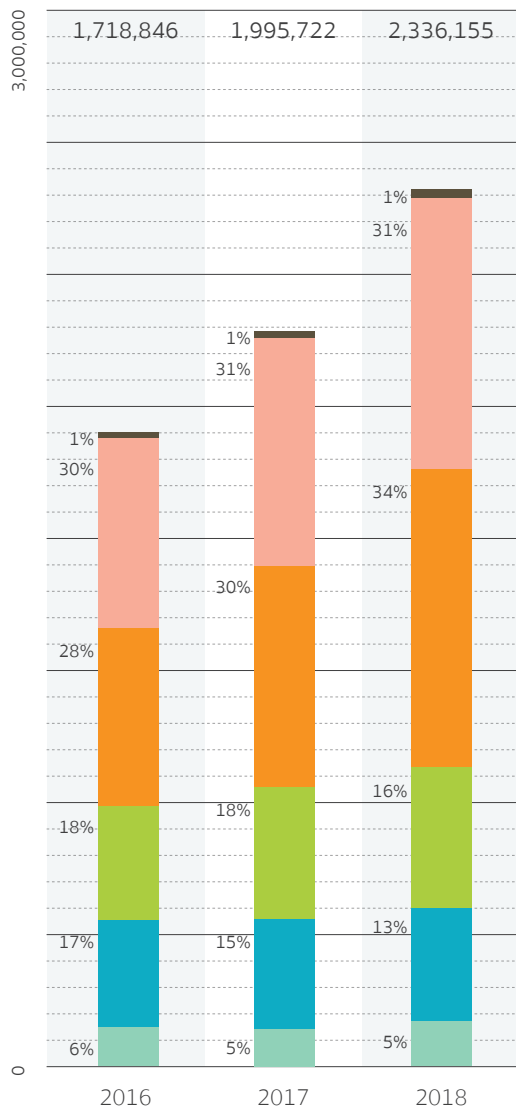
2/ As if the par split has been implemented since the beginning

3/ Debt = Interest Bearing Debt

Financial Highlights

Sales and Service Income (THB million)

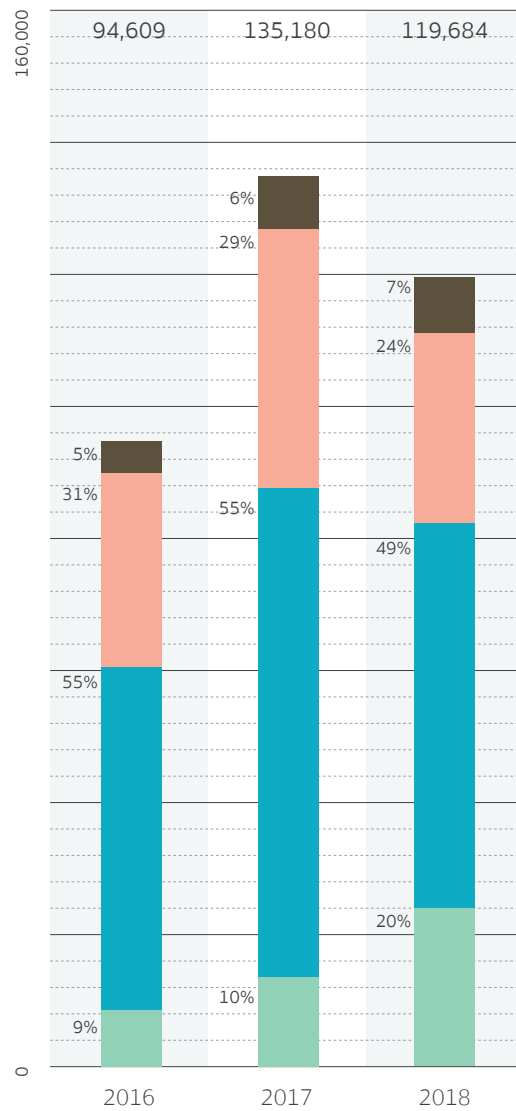
2,336,155



- Others
- Petrochemical and Refining Business
- International Trading Business
- Oil Business
- Gas Business
- PTTEP

Net Income (THB million)

119,684

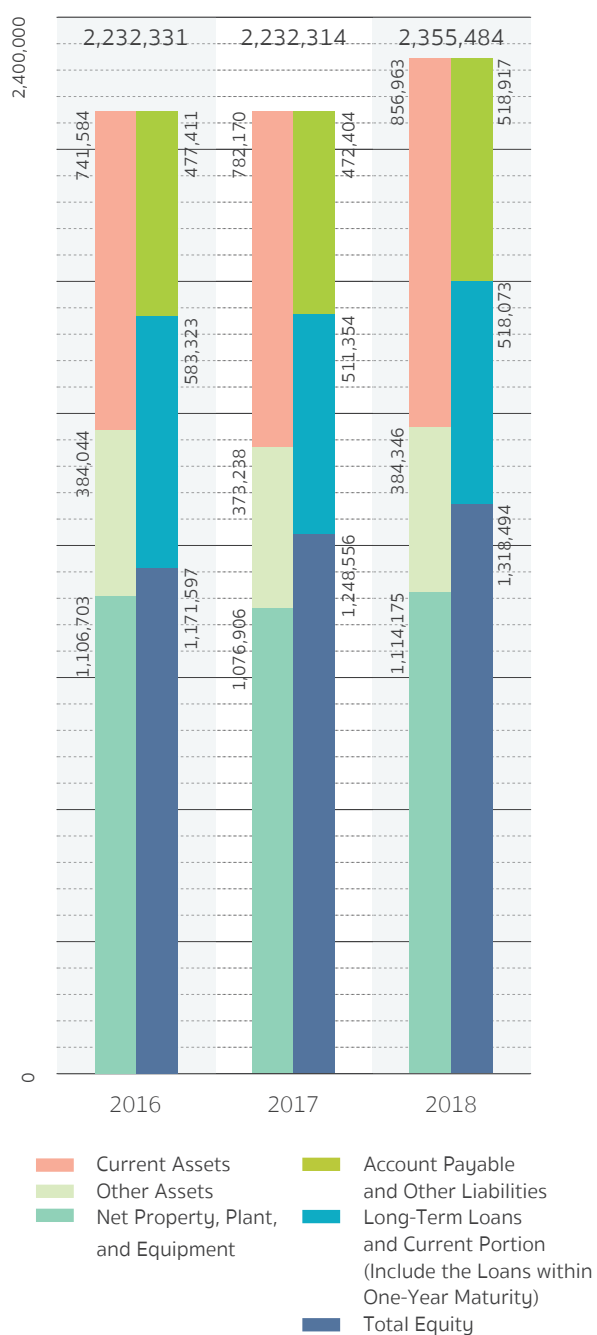


- Other Affiliates
- Petrochemical and Refining Affiliates
- PTT
- PTTEP

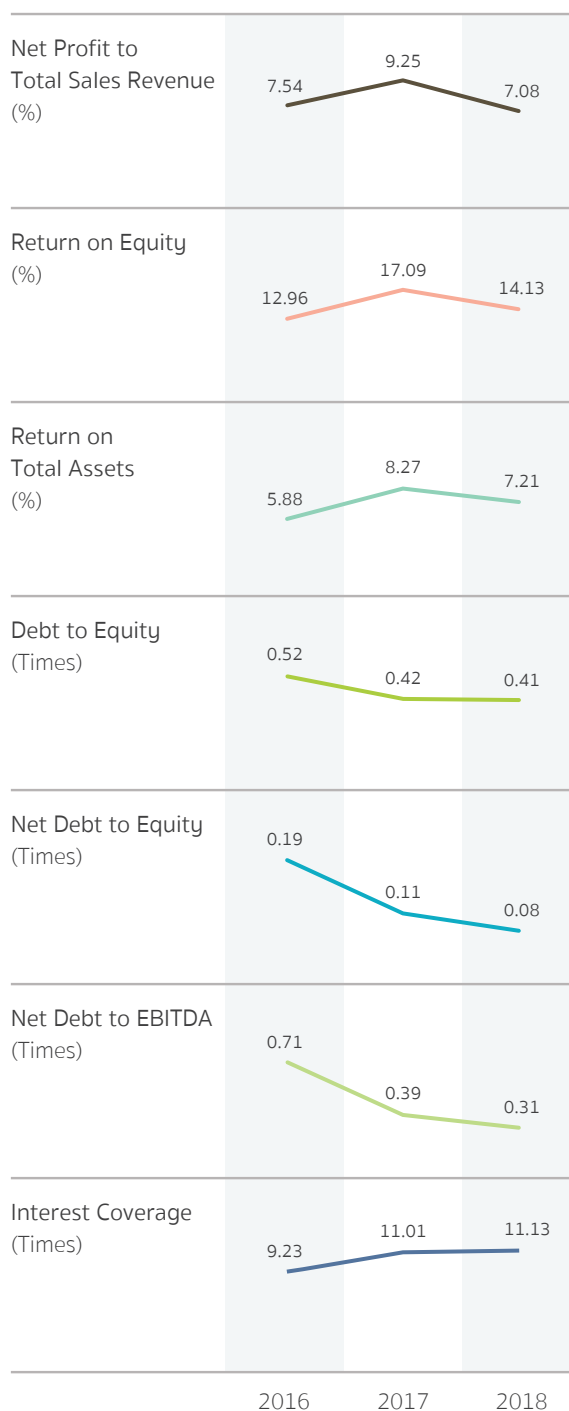
Statement of Financial Position (THB million)

2,355,484

0.0% ▲ +5.5%



Financial Ratios



Message from the Board of Directors

Dear Shareholders

The year 2018 marked the 40th year of PTT's establishment. Throughout these years PTT has ensured national energy security and economic prosperity and grown with the community, society and the country to the present. It remains committed to being the Pride and Treasure of Thailand through the 3Ps sustainable management strategy: **People** for human resource development, **Planet** for conservation of natural resources and the environment in balance with the well-being of the community and society, and **Prosperity** for being a solid pillar of the economic and social sectors, conducting business in compliance with good governance and balancing interests of all stakeholders while pursuing sustainable growth for all.

People – PTT emphasizes inclusive growth. It develops its employees to be smart and conscientious who assist the underprivileged and elevate their quality of life to enhance national development. Significant projects under this strategy included educational promotion, particularly science and technology. PTT and 11 leading private companies continued from last year's development of Phacharath School Phase 2, totaling 82 schools in 14 provinces and expanded to the Partnership School Project by sharing experience in managing private schools of PTT Group in five provinces. PTT also supported secondary education. The first batch of 71 students from its Kamnoetvidya Science Academy School (KVIS) have graduated, and 17 of them have won scholarships to study abroad. Vidyasirimedhi Institute of Science and Technology (VISTEC), top-ranked nationally in chemical sciences by the leading international research journal, Nature Index Ranking 2017, supported higher education. In addition, PTT launched "Café Amazon for Chance", the first coffee shop operated by hearing impaired bansta. Presently, Café Amazon for chance has four operations intend to give an opportunity and develop the potential for the underprivileged to become self-reliant, and instilling in employees ethical awareness.





CHANGE FOR FUTURE OF THAILAND 4.0



Planet – PTT exerted social, community and environmental stewardship, raised awareness of natural resource and environmental conservation, supported resource optimization, and developed more green areas across the country. In 2018, the Board of Directors approved additional targets for its climate action, one of the SDG targets, and continued implementation under natural resource and environmental conservation projects, from keeping the areas under the 1 million Rai nationwide reforestation project, Sirinart Rajini Ecosystem Learning Center in Prachuap Khiri Khan, PTT Green in the City in Bangkok, Wang Chan Valley in Rayong (which won an award from the International Federation of Landscape Architects (IFLA) this year), and a cooperation project to develop a green economy and tourist destination known as the Sustainable Khung Bang Kachao Project. Development of these reforestation projects has resulted in approximately 37.27 million tons of carbon dioxide absorption or emission of over 1 million vehicles per year and added about 29.81 million tons of oxygen to the atmosphere, enough for over 5.7 million persons to breathe for a year. The surrounding communities also derived economic benefit by collecting forest products valued at over THB 280 million per year. PTT also encourages its employees to take part in community activities to better understand community needs and engage in good deeds for the community and society. In 2018, PTT was listed in the Thailand Voluntary Emission Reduction

PEOPLE

PLANET

PROSPERITY

Program (T-VER) for its Waste Heat Recovery Project of gas separation plant Units 5 and 6 in Rayong and won a Zero Accident Award for its implementation on accident-free workplace promotion, safety and occupational health management, and workplace health promotion.

On **Prosperity**, PTT focuses on creating economic and social growth and sustainability under transparency and good governance principles. The Board has approved establishment of the Governance, Risk and Compliance (GRC) structure to undertake efficient and concrete integrated management. For the business operation, PTT continued its implementation under the 3D strategies:

- **Do now** - to enhance PTT Group's competitiveness through enhanced operational efficiency with emphasis on innovation and technology in business to reduce costs and increase profits to over THB 19 billion.
- **Decide now** - to support infrastructural investment and expansion of businesses which create added value throughout the business chain, both domestic and international, for sustainable business, such as gas transmission pipeline expansion, LNG value chain

investment through the completion of LNG terminal extension, establishment of PTTOR China to conduct a lubricant business in China, expansion of an integrated petrochemical and refinery business by investing in petrochemical expansion to support value-added specialty chemical, and also the restructuring of key businesses. To elaborate, its IRPC shareholding rose to 48.05% in line with the petrochemical and refinery business direction for future growth. Significantly, the transition of the former Oil Business Unit and related shares to PTT Oil and Retail Business Plc. (PTTOR) help pushing PTT Group's flagship company in line with the oil deregulation policy to expand oil and retail businesses growing together with society and lead Thai brands to the international markets.

- **Design Now** – to pursue new business opportunities and investment (New S-Curve) for long-term growth in line with the Thailand 4.0 policy. To this end, PTT signed memoranda of cooperation with various organizations for projects on financial innovation with nine local leading banks, electricity value chain, EV innovation, smart city development, prototype battery development, among others. PTT also approved investment in the infrastructural construction under the Eastern Economic Corridor of Innovation (EECi) Project to support the development of Wang Chan Valley as the R&D center of innovation and technology to be applied to all its implementation to create added value throughout PTT's business chain.

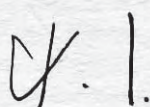
Build Smart people
Support good people

Determined to foster
the society, communities,
and environment

Generate growth and
sustainability to Thai
economy and society on the
basis of transparency

In 2018, Thai economy grew 4.1%, exceeding the previous year, against global economic growth of 3.7%. The Dubai oil price fluctuated in the USD 50-85 per barrel range, which was weaker than the average price of last year. As a result, our financial performance showed a revenue of THB 2.3 trillion and a net profit of THB 119.684 billion, consisting of profits from PTT's operating performance (49%) and from PTT Group's (51%). The profit enabled PTT and PTT Group to remunerate the government in the forms of tax and dividend of over THB 80 billion. PTT's success was also echoed in its listing on the Dow Jones Sustainability Indices (DJSI) World Index (DJSI World) for the seventh consecutive year along with the highest scores in the Industry Leader category in Oil & Gas and Upstream & Integrated (OGX) for the second consecutive year. Other awards included the Corporate Improvement Excellence Award for two consecutive years, granted by HRH Princess Maha Chakri Sirindhorn, Finance Management Excellence Award, State Enterprise of the Year (third consecutive year), Outstanding Corporate Leader, Outstanding Information Disclosure and Transparency (fourth consecutive year), and Outstanding Development Cooperation in a State Enterprise Mentor Project—the cooperation between PTT, State Railway of Thailand, and Public Warehouse Organization—among others. These awards resulted from all executives' and employees' dedication and commitment as well as a good governance of the Board of Directors.

On behalf of the Board of Directors, may we express our heartfelt appreciation to all shareholders and stakeholders for their continued trust and support. We reassure here that the Board, the management and all employees determine to create Social value remain the Prile and Treasure of Thailand, gear to wards its 41st year and the future.



(Krairit Euchukanonchai)
Chairman



(Chansin Treenuchagron)
President and CEO

Report of the Audit Committee



A handwritten signature in black ink, appearing to read 'Dr. Kittipong Kittayarak'.

Emeritus Prof. Dr. Kittipong Kittayarak
Chairman of the Audit Committee

Dear Shareholders

PTT Plc's current Audit Committee consists of three knowledgeable independent directors, chaired by Emeritus Prof. Dr. Kittipong Kittayarak, with Ms. Nuntawan Sakuntanaga and Mr. Vichai Assarasakorn serving as members. Serving as secretary to this committee is Mr. Chalot Boonlai, Executive Vice President, Office of Corporate Audit.

In 2018 the committee executed its Board-assigned duties and those defined by its own charter, which agreed with SEC's best practices. It reviewed and pushed for PTT's compliance with corporate governance and applicable regulations in addition to having adequate risk management and internal control systems. It ensured PTT's emphasis on being a transparent organization with an efficient and effective internal audit system while upgrading the quality of internal audit by aligning corporate goals with that of internal audit agents to form a trustworthy partnership to supplement long-term value creation for PTT with due regard for satisfying stakeholders' comprehensive needs. Below are the highlights:

- Forming a structured unit to integrate Governance, Risk Management and Compliance (GRC) with top executive taking clear charge.
- Giving support to the management to improve the operations to make PTT an organization of pride with emphasis on transparency moving toward sustainability by forging business integrity with responsibility for national energy security and taking part in driving the nation's economy in its capacity as one of Thailand's leading state enterprises.
- Promoting procurement anti-corruption by incorporating large-scale investments of PTT and companies in PTT Group into the Integrity Pact (IP) project under public policy and Public Procurement and Supply Management Act, B.E. 2560 (2017). Furthermore, the committee pushed toward PTT's improved whistleblowing process to ensure efficiency, effectiveness, and fairness to all.

- Forging careful analysis and review of the investment process and development of a systematic Post-Investment Review (PIR), particularly for large-scale investments under PTT and PTT Group.

- Promoting application of technology in the audit process and expanding the use of the Continuous Control Monitoring and Auditing System (CCMS), which helps detect and follow up irregularities in the sales of and the payment for natural gas for vehicles in addition to the procurement system for higher efficiency and effectiveness of the audit system and its oversight.

- Devising an audit policy that includes continuous personnel development with a focus on higher audit efficiency of the business process while valuing risks that may have significant impacts on the organization, adoption of modern IT systems to support internal auditing, and cooperation with units in charge of auditing (2nd Line of Defense).

- Giving support to the STAR Award Project, which stresses efficient, effective, transparent, and examinable operations of the 1st Line of Defense (Operating Units) and 2nd Line of Defense (Oversight Units) to foster a proper attitude toward internal audit

In 2018, the committee held 17 meetings, where consultations were held with the management, the internal auditor, and the external auditor as follow:

Audit Committee

Number of Meetings Attended

Prof. Dr. Kittipong Kittayarak	17
Ms. Nuntawan Sakuntanaga	15
Mr. Vichai Assarasakorn	17

Summary of Performance

1. Review of financial statements:

With the management, the Office of Corporate Internal Audit and the External Auditor, the committee reviewed PTT's quarterly, annual financial statements, consolidated financial statements this year as well as connected transactions, related party transactions, or those with potential conflicts of interest. The committee asked the external auditor about the accuracy and completeness of financial statements, the adjustment of key account entries and projections affecting the statements, the adequacy and suitability of account recording, audit scope, information disclosure that was accurate, complete, adequate as well as its own freedom. All these elements ensured that the preparation of financial statements followed legal requirements and accounting standards under generally accepted accounting principles that are credible and timely, also that adequate information was disclosed in such statements for the benefit of users. The committee met exclusively with the external auditor team on one occasion in the absence of the management to consult them about audit plans, freedom of execution, their professional views with a focus on accurate, complete, and adequate presentation of data.

2. Review of risk management:

Each quarter, in conjunction with the management, the committee reviewed the efficiency and effectiveness of the risk management process as well as the risk management policy, plans, and management approach that affect PTT Group's operations and other event risks. It provided recommendations for improvement and supported the management's development of a systematic work plan to be ready to address unforeseen events.

3. Review of internal control effectiveness:

Every quarter, the committee reviewed PTT's internal control system with the Office of Corporate Audit by looking into its operation; resource consumption; stewardship of properties; prevention or reduction of errors or damage, losses, waste, or corrupt practices; credibility of financial reports; compliance with laws and regulations; and Cabinet resolutions. No significant problems or material shortcomings were detected. This year's assessment outcomes of internal control under the Ministry of Finance's Internal Audit Standards for Government Agencies, B.E. 2561 (2018) found that PTT's internal control was adequate and effective for its businesses. Full cooperation (100%) was received from the management in filling out the internal control assessment form.

4. Review of good governance:

The committee reviewed compliance with applicable laws and regulations, PTT business protocols, and related party and connected transactions among PTT Group to ensure sensible conformance to normal business conditions. The committee also reviewed the complaint-handling and whistleblowing process and provided recommendations on process improvement to raise efficiency and effectiveness in line with PTT's corporate governance code and business philosophy. These included careful consideration of complaints for fairness to all parties, equipped with suitable protection of complainants and whistleblowers.

5. Review of internal audit:

The committee reviewed the Office of Corporate Audit's strategic plans, annual and long-term internal audit plans, also conformance to plans and audit findings. To this end, it advised and monitored corrective actions for significant aspects of good governance and adequate internal control. It considered amending the charter for internal audit and reviewed the annual budget of the office, its personnel development, recruitment, rotation, and training plans. Reviewed were the office's adequacy and suitability of resources, KPIs, and the annual merit consideration for the executive vice president. The committee also monitored the assessment of overall internal audit performance.

6. Quality assurance of the Audit Committee:

The committee not only reviewed and amended its own charter, but also assessed its own performance as a group and individuals (Performance Self-Assessment and Cross-Assessment) in line with the best practices of the State Enterprise Policy Office to ensure efficient and fruitful performance. Assessment findings were regarded as excellent. Finally, the committee reported its performance outcomes to the Board every quarter, with remarks and views provided for process improvement of risk management supervision and compliance with PTT's regulations.

7. Proposal of the external auditor for 2019:

The committee endorsed the Office of the Auditor General of Thailand (OAG) as PTT's external auditor, 2019 for the Board's concurrence and the shareholders' final approval at the 2018 AGM, together with its audit fees. Incidentally, in the absence of PTT's management, the committee reviewed with the external auditor its work scope, approach, and plans.

In summary, the Audit Committee performed its charter duties and responsibilities with competence, care, prudence, and adequate freedom while providing views and recommendations for the equitable benefit of all stakeholders. Its opinion is that PTT's financial statements were accurate, credible, and in line with generally accepted accounting standards. In addition, PTT commanded compliance with applicable laws and business obligations, together with good governance, conformance to rules, adequate risk management and a suitable, effective internal audit system.

Report of the Nomination Committee



Air Marshal Boonsuib Prasit
Chairman of the Nominating Committee
(November 18, 2016 - December 22, 2018)

Mr. Don Wasantapruerk
Chairman of the Nominating Committee
(December 23, 2018 - Present)

Dear Shareholders

The current Nomination Committee consists of three independent directors, chaired by Mr. Don Wasantapruerk (since December 23, 2018), replacing Air Marshal Boonsuib Prasit (November 18, 2016 - December 22, 2018), together with Mr. Supot Teachavorasinskun and Prof. Dr. Surapon Nitikraipot as members. The Corporate Secretary or Executive Vice President, Corporate Secretary and Relations, serves as its secretary. The committee performed Board-assigned duties with prudence, transparency, and fairness. The committee also amended its scope to embrace current duties and aligned with PTT's business strategies for shareholders' and stakeholders' best interests. This year, it holds a total of six meetings as follow:

- Nominated directors to replace those who were due to retire by rotation from various professions with suitable qualifications as required by related laws and regulations, PTT's Articles of Association, and corporate governance principles. Nominated candidates must be competent and suitably qualified for PTT's business strategies, based on an analysis of the PTT Board Skill Matrix, list of the Director's Pool of the Ministry of Finance and Thai Institute of Directors (IOD). Their work experiences and backgrounds were taken into account to ensure shareholders' confidence. They must also be free of tarnished background and conflicts of interest with PTT. The names of duly qualified candidates were tabled for the Board's approval to appointed by the AGM. Those names must also have the approval of the State Enterprise Policy Committee, according to the 2014 Regulations of the Office of the Prime Minister on Policy and Supervision of State Enterprises.

- Nominated directors to replace those who had resigned during the year. The committee tabled qualified candidates with suitable profiles to the Board for appointment. The names of nominated directors must also secure approval from the State Enterprise Policy Committee.

- Nominated directors to perform duties on specific committee, based on committee compositions, qualifications, expertise, competencies, related skills and suitability for the Board's appointment, with the exception of the Nomination Committee itself, which is to be appointed by the Board.

- Reviewed and amended the PTT Board Skill Matrix to be more diversified, modern and suitable for PTT's businesses by adding essential skills, knowledge, and familiarity that cover both educational background and experiences in line with PTT's business strategies in the short and long terms, together with the state enterprise strategic plan, with a primary objective of driving the company toward its goals under the defined mission and strategies.

- Improved its own job performance to be more thorough, suitable, timely, and compatible with PTT's good corporate governance principles.

Finally, this year the Board gave minor shareholders the opportunity to nominate directors but no such nomination was put forward for the 2019 AGM. For transparency, other details appear in this annual report.

Report of the Remuneration Committee



Mr. Vichai Assarasakorn

Chairman of the Remuneration Committee

Dear Shareholders

This year, the Board of Directors appointed the current Remuneration Committee, which consists of independent directors in the majority, chaired by Mr. Vichai Assarasakorn, an independent director, with Mr. Somsak Chotrattanasiri and Mr. Chumpol Rimsakorn as members. Serving as secretary was the Corporate Secretary or Executive Vice President, Corporate Secretary and Relations. The committee performed their duties with prudence and care by screening and commenting on key issues for the Board's consideration. This year, the committee held three meetings as follow.

- Considered the 2018 compensation for the Board and committees, based on PTT's performance outcomes and business size, practices of peer-industry listed companies and leading ones worldwide, along with Board responsibilities and the outcome of Board assessment as defined in the annual assessment forms. The compensation was tabled for the Board's approval and subsequent appointment at the AGM.

- Reviewed assessment guidelines for the performance of the President & CEO to decide his new compensation, based on factors linked to the agreement of the annual performance assessment for state enterprises mutually agreed by the State Enterprise Policy Office and PTT, together with his managerial ability, leadership, his self-assessment, and assessment by all directors. All these served as a basis for the committee's consideration before tabling its views to the Board for approval.

- Acknowledged and commented on the assessment of executives at the senior executive vice president level.

- Reviewed and commented on the GRC (Governance, Risk, and Compliance) structure and work values for maximum benefit to the organization in sustainably enhancing its people, process and system's efficiency, performance, and value addition to PTT Group's brand. In place is a responsible unit in the systematic integration and a center for receiving complaints under transparent and clear criteria to maintain balance between efficient control and business conduct and manage the operations of PTT Group under the same standard.

For transparency, the Remuneration Committee has disclosed the compensation of all directors and committee members together with management executives' compensation in this annual report.

Report of the Corporate Governance Committee



A handwritten signature in black ink, appearing to read 'Chatchalerm Chalermsook'.

Gen. Chatchalerm Chalermsook
Chairman of the Corporate
Governance Committee

Dear Shareholders

The current Corporate Governance Committee is made up of three independent directors, namely Gen. Chatchalerm Chalermsook (Chairman), Mr. Thon Thamrongnawasawat (member), and Prof. Dr. Surapon Nitikraipot (member replacing Mr. Don Wasantapruek as of December 23, 2018). The Senior Executive Vice President, Corporate Governance and Regulatory Affairs, and the Senior Executive Vice President, Office of General Counsel, serve as secretaries.

Highly valuing business conduct with integrity, transparency, and accountability while saying no to all forms of corruption, the Board stresses PTT's firm commitment to corporate governance (CG), high ethical standard, the Code of Business Conduct, and PTT Group's scope of sustainability development to heighten PTT's CG system for continued efficiency to in turn boost confidence among all its stakeholders and lead to PTT's sustainable growth.

To this end, the Board has assigned the committee to propose CG guidelines and oversee the conduct of the directors and the management to ensure conformance to CG principles, SET's CG principles, IOD's recommendation from the Corporate Governance Assessment Report, and the international principles of The Organization for Economic Cooperation and Development (OECD) together with the ASEAN CG Scorecard, the Ten Principles of the UN Global Compact (UNGC), and the DJSI Corporate Sustainability Assessment. The committee's mandate also embraces sustainability management and scope formulation for the oversight of PTT's anti-corruption tasks.

In 2018 the committee held six meetings as planned to track and assess CG and anti-corruption tasks, public relations and corporate image plans as well as social, community, and environmental responsibility and sustainable development plans, as highlighted below:

Information disclosure and transparency

- Completed the annual information disclosure form (Form 56-1) and the annual report, and disclosed quarterly performances and key information for shareholders, investors, and the public, complete with essential, adequate, credible, and timely details through assorted channels, including SET's publicity channels and www.pttplc.com. The core units taking charge of information distribution were Investor Relations and Corporate Communications.
- Developed the 2018 annual sustainability report for the 11th consecutive years to disclose economic, social, and environmental data under the applied Sustainability Reporting Standard 2016 and Oil and Gas Sector Disclosure (OGSD) of the Global Reporting Initiative (GRI). It presented performance in accordance with Integrated Reporting (IR), provided updates in compliance with the elements of the United Nations Global Compact (UNGC), and reported operating outcomes that confirmed PTT's support for sustainable development goal in line with the scope of the UN's Sustainable Development Goals (SDGs). Also, a third party was commissioned to continually review the report, with distribution of this year's and previous years' reports on PTT's website, GRI's website, and UNGC's website. In addition, PTT advocated preparation of this report by PTT Group companies, namely PTTEP, GC, Thaioil, IRPC, and GPSC, on compliance with SET's direction of convincing listed companies to use GRI in their information disclosure.
- Developed the quarterly PTT Bizway newsletter for shareholders to keep them informed and foster understanding.
- Developed the quarterly Happiness newsletter for debenture holders to keep them informed and foster relations.

Rights of the shareholders

- Held the 2018 AGM and provided in advance adequate and timely information on the date, time, venue, and agenda, as well as all information relevant to matters which require decisions at the meeting
- Informed the shareholders about meeting protocols and distributed such information on PTT's website before sending out meeting notices so that shareholders may have adequate time to study details. Facilitated their full exercise of meeting and voting rights. As a result, PTT scored "outstanding" on the AGM Checklist assessment.

Equitable treatment of shareholders

- Allowed shareholders to propose additional agenda items and nominate directors for election in advance from September 1 to November 30, 2018, as required by PTT.
- Required all directors and executives to disclose vested interests about themselves and related parties for 2018 so that the Board might review PTT's transactions with potential conflicts of interest and decide in PTT's best interests.
- Required all directors, executives, and employees to electronically report their conflicts of interest for 2018 on the PTT intranet. No significant conflict was reported this year.
- Required all directors and executives to report their securities portfolios as required by law and assigned the Corporate Secretary to compile and report these to the Board every quarter.
- Ensured enforcement of the Insider Trading Guidelines by asking the directors and the management of PTT Group to refrain from PTT Group companies' securities trading. If such trading is necessary, they must notify the Corporate Secretary ahead of time for transparency.

Responsibilities of the Board

- Assessed Board performance (overall, self-assessment, cross-assessment, and subcommittee assessment), with "outstanding" outcomes for the year.
- Attended training courses regularly to build capacity and develop expertise in directorship, such as courses hosted by the Thai Institute of Directors (IOD).
- Arranged a study tour of PTT Group companies and undertakings dealing with the energy business, in and outside Thailand.
- Held one meeting among the independent directors.
- Held one meeting in absence of the management.

Recognition of stakeholders

- Endorsed an action plan on PTT's CG and anti-corruption for 2018 together with the annual goals before implementation, followed by constant performance monitoring, with recommendations provided to upgrade PTT's CG on a par with international standards.
- Provided oversight for the review of "PTT Corporate Governance, Ethical Standards and Code of Business Ethics Handbook" regarding the number of state enterprises / juristic persons where PTT directors can serve as directors, which would result in higher efficiency and oversight transparency, and regarding the amendment of duties and responsibilities of the Enterprise Risk Management Committee to also cover stakeholder management.

- Formulated policies and provided recommendations on organization restructuring, in which Corporate Governance and Regulatory Affairs is to be established as a single unit working to integrate corporate governance, risk management, and compliance to ensure suitable control and efficient operation in support of business continuity.

- Provided oversight for a review of the Corporate Governance Management Committee (CGMC) responsibilities by renaming it the Governance, Risk and Compliance Management Committee (GRCMC) and expanding the committee's role to cover corporate governance, operational risk management, internal control, and compliance management. GRCMC also serves as PTT's Anti-Corruption Operation Center for State Enterprises.

- Advocated and urged PTT's business allies to declare their intention to join Private Sector Collective Action Coalition against Corruption (CAC).

CSR and sustainable development

- Defined a social responsibility (CSR) approach in support of PTT Group Sustainable Framework by committing to corporate citizenship that values stewardship of society and communities, as well as major groups of stakeholders at all operating sites whose wellbeing PTT aims to raise. PTT's stewardship also covers network communities across the country under the two-dimensional sustainable development goal – People and Planet – in line with PTT's business direction. PTT optimizes its expertise in driving community self-development, particularly support for creating an inclusive business which stresses inclusion of the underprivileged and low-income earners as part of PTT's business.

People (development of human resources, communities, and society) – promotes items 4, 7, and 8 of the UN Sustainable Development Goals (SDGs) involving access to quality education, affordable and clean energy, and decent work and economic growth.

Planet (conservation of natural resources and the environment) – promotes items 13, 14, and 15 of the UN SDGs involving expansion of green areas, life below water, life on land, and absorption of greenhouse gases.

- Passed assessment by RobecoSAM Corporate Sustainability Assessment and qualified as a member of Dow Jones Sustainability Emerging Markets Indices (DJSI Emerging Markets) in the Oil and Gas Upstream & Integrated Industry (OGX) category for the seventh consecutive year and with the highest score for the second consecutive year, among the nine out of 71 companies on DJSI Sustainability World Indices (DJSI World) and among the two out of 17 companies on Dow Jones Sustainability Emerging Markets Index (DJSI Emerging Markets). PTT achieved an industry-best score on Risk and Crisis Management, Code of Business Conduct, Supply Chain Management, Tax Strategy, Environmental Reporting, Environmental Policy/EMS, Human Rights, and Occupational Health and Safety.

Awards of pride

Thanks to its firm commitment to operating businesses with CG and social responsibility, coupled with constant sustainability management and improvement, in 2018 PTT earned extensive acclaim from domestic and international entities alike. Awards included:

- Qualified as a member of Thailand's Private Sector Collective Action Coalition Against Corruption (CAC) for the second consecutive year.

- Passed NACC Integrity & Transparency Assessment (ITA) at the "very high" level for five consecutive years.

- Received "Excellent" ranking based on the 2018 survey of listed companies (Corporate Governance Report of Thai Listed Companies 2018) for ten consecutive years.

- Received an outstanding award for its code of conduct at the TCC Best Award 2018 event organized by the Thai Chamber of Commerce.

- Received a Corporate Governance Asia Annual Recognition Award 2018: Icon on Corporate Governance for 14th consecutive years.

- Received The Asset Corporate Award 2018 (Platinum level) in its 10th consecutive years of assessment.

- Received an ASEAN Corporate Governance Award as a Thai listed company that had successfully passed the ASEAN CG Scorecard, recognized as one of the top three public companies in Thailand and one of the top 50 public companies in ASEAN.

Report of the Enterprise Risk Management Committee



A handwritten signature in black ink that reads "Thon Thamrongnawasawat".

(Mr. Thon Thamrongnawasawat)

Chairman of the Enterprise
Risk Management Committee

Dear Shareholders

PTT Plc's Enterprise Risk Management Committee (ERMC) consists of three directors, chaired by Mr. Thon Thamrongnawasawat, with Mr. Thammayot Srichuai and Mr. Danucha Pichayanan serving as members. The Senior Executive Vice President, Corporate Strategy, in the capacity of Chief Risk Officer (CRO) serves as its secretary.

ERMC has supported the Board's performance by following corporate governance principles to keep PTT's risk management efficient and effective for successful goal achievement while aligning with the corporate vision and directions, as well as mitigating impacts of business uncertainty. The key is to ensure shareholders that PTT's risk management system can indeed handle all risks.

This year ERMC held a total of five meetings. The highlights of its performances are as follows:

1. Steered risk management to ease business impacts:

Defined proactive measures with a focus on lowering the probability of all risk events while commanding passive measures should risk events actually happen so as to ease impacts on corporate goals. Defined comprehensive risk management plans to cope with all situations. This year, due to volatile foreign-currency exchange rates, which posted direct impacts on business transactions, ERMC was assigned an additional task to closely monitor financial risks from such volatility. In addition, ERMC managed risks to ease impacts from oil price volatility by deploying hedging tools and managed risk from the Bongkot and Erawan petroleum blocks bidding, which PTTEP has won, to ensure efficient, uninterrupted operation and support its mission of enhancing the energy security of Thailand.

2. Oversaw corporate stakeholder management:

This was intended to make such management complete and embrace thorough management for all stakeholders. To this end, key business plans were taken into consideration to reduce possible impacts on each group of stakeholders. Then, the findings were used in strategizing and planning for stakeholder management that suited each circumstance. Finally, a scope for monitoring, and assessing such management was laid down along with a review of ongoing stakeholder management plans.

3. Closely monitored risk management every quarter:

Instituted leading KRIs (Key Risk Indicators) and lagging KRIs. Counseled the management on the improvement of its business practices by revising risk management plans to align with prevailing business strategies and circumstances. Finally, reported ERMC's performance to the Board.

4. Deliberated and commented on long-term obligations, business complication, and significant impacts on PTT:

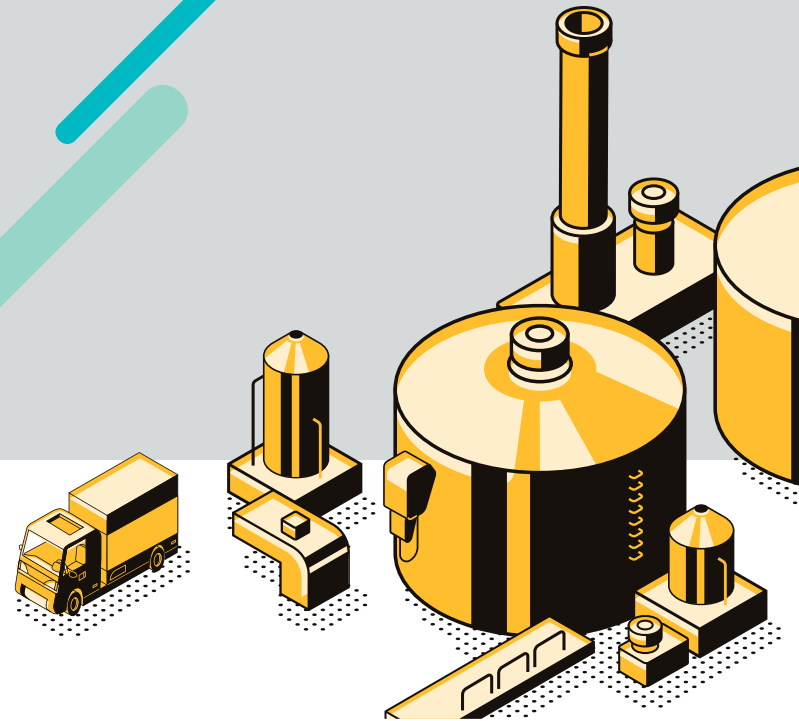
This was done before tabling them to the Board.

5. Screened the list of 2019 corporate risks and sought endorsement of the Board:

To this end, a list of risk items and corporate risk management plans were integrated with the preparation of the 2019 enterprise plans. As a result, risk management plans became more explicit, in line with the corporate directions, goals, and business strategies. Implementation was cascaded across the corporation to address risks and promptly become poised for risk handling.

Thanks to all personnel's value given to excellence in risk management and strategies, dedication, and cooperation, the year was regarded as a successful one for risk management, with all risks contained to manageable levels. Such, risk management success supported PTT's full business performance and expansion amid challenging circumstances.

Overview and Outlook of Economy, Petroleum and Petrochemical Industries



Review of 2018

World Economic Review

The world economy in 2018 expanded at a slightly slower pace than in 2017, reflecting weaker growth in the advanced economies, especially in the Eurozone where export growth slowed on the back of a stronger euro after a surge in the final quarter of 2017, despite favorable financial conditions helping support the Eurozone economy in 2018. Meanwhile, US economic growth accelerated sharply, as strong labor market and federal tax cuts helped boost consumer spending, allowing the Federal Reserve to increase its policy rate four times in 2018, amid uncertainty created by the trade dispute with China. As for emerging markets and developing economies, economic growth slowed in China, but still above the government's target of 6.5%, amid authorities' deleveraging campaign and Chinese exporters front-loading their shipments over trade war fears. The International Monetary Fund (IMF) in January 2019 estimated global economic growth for 2018 at 3.7%, compared with a 3.8% growth in 2017 (Figure 1).



Estimated global
economic growth
for 2018 at

3.7%

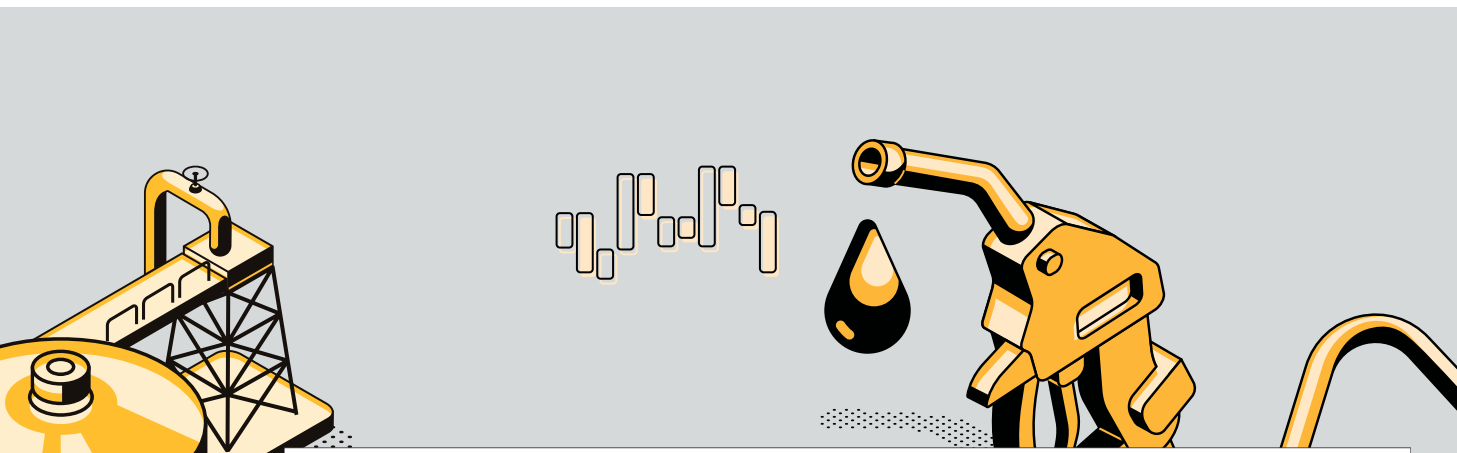


Figure 1

Global Economic Growth
2016 - 2018

Unit: % yoy
Source: IMF, January 2019

- World
- Advanced Economies
- Emerging Market and Developing Economies

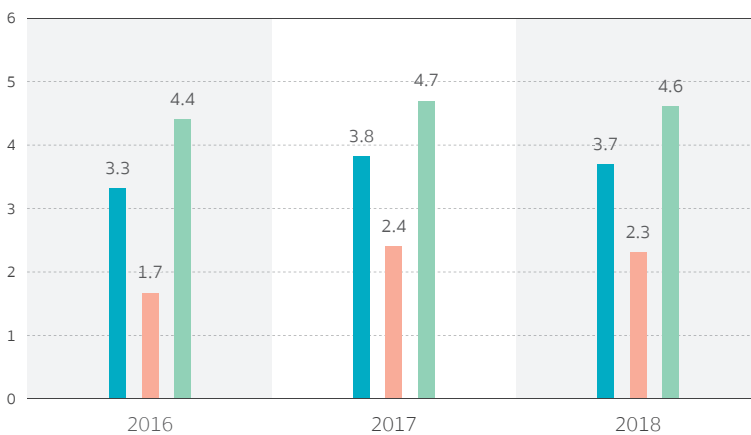
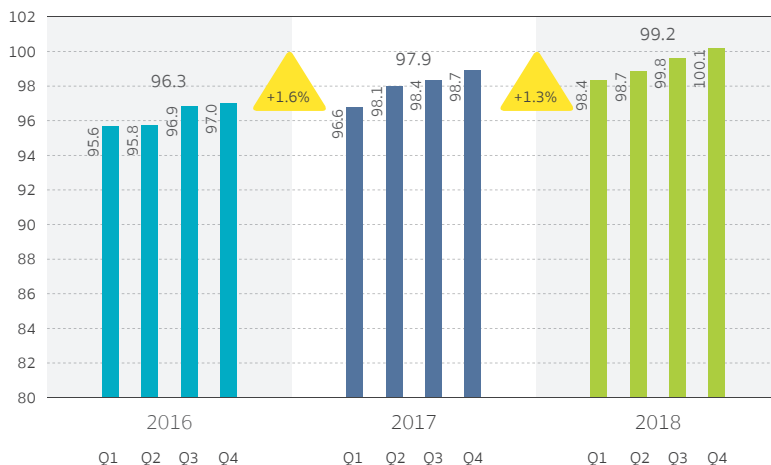


Figure 2

World Oil Demand
2016 - 2018

Unit: Million barrels/Day
Source: IEA, December 2018



Petroleum and Petrochemical Review

World oil demand in 2018 increased 1.3 million barrels per day, slower pace than in 2017, driven by weaker global economic growth and much higher oil prices. The International Energy Agency (IEA) in February 2019 estimated world oil demand growth for 2018 at 99.2 million barrels per day (Figure 2).

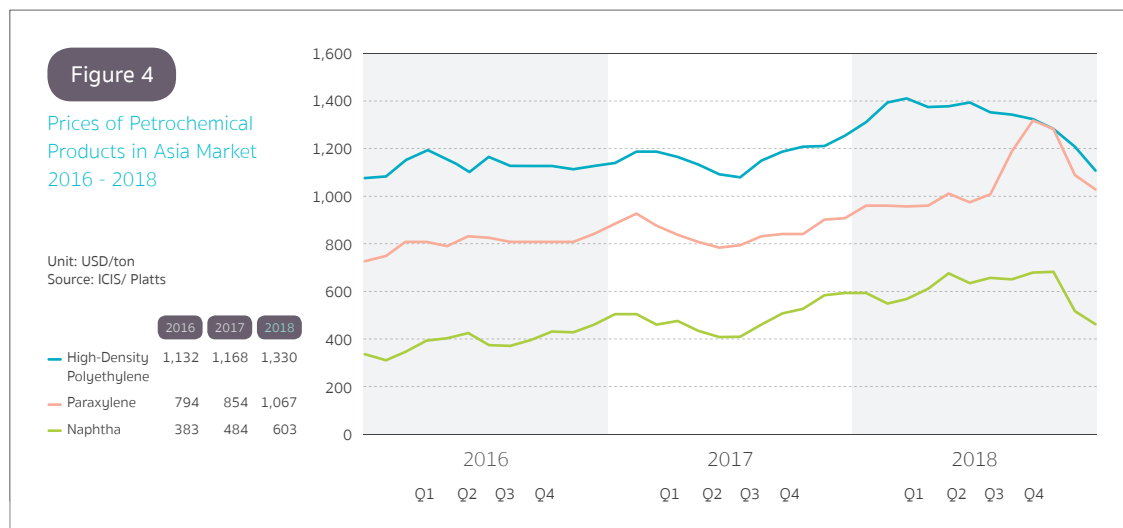
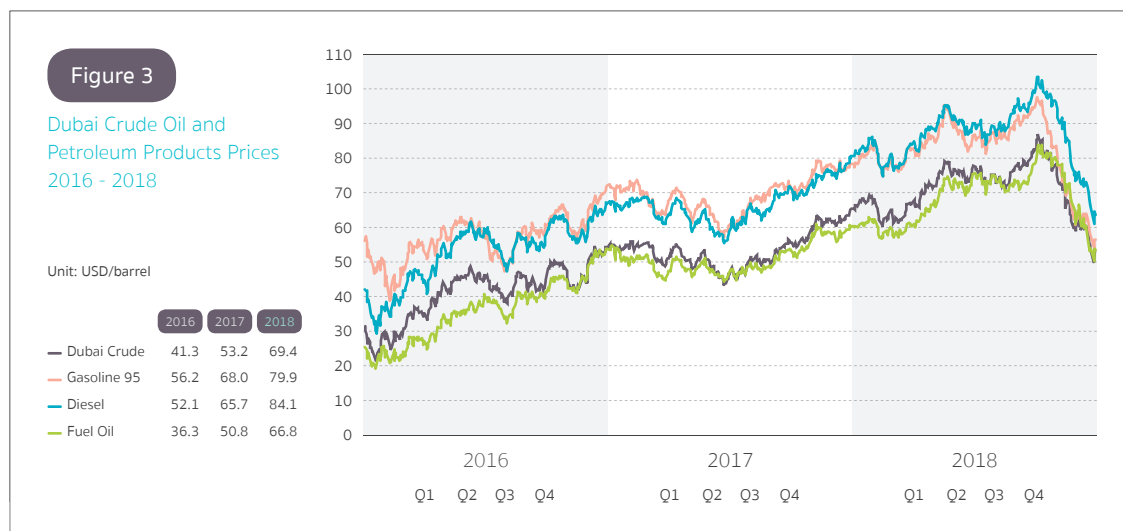
Stronger world oil demand – together with concerns over supply tightness due to OPEC and non-OPEC production cut measures, sliding Venezuela’s crude oil exports, geopolitical tensions in the Middle East, resumption of US sanctions on Iran, and US crude oil exports being constrained by logistical restrictions – resulted in Dubai crude oil price averaging USD 69.4 per barrel in 2018, compared with a USD 53.2 per barrel average in 2017 (Figure 3).

As for the prices of refined petroleum products in 2018, the price of gasoline 95 octane averaged USD 79.9 per barrel, an increase from 2017 amid higher crude oil prices and flat gasoline demand growth, despite the rising Chinese supply raising gasoline inventories above the five-year average and putting some downward pressure on gasoline prices. All these led to a significant fall in gasoline crack spreads in 2018. Diesel price in 2018 averaged USD 84.1 per barrel, an increase from 2017 amid higher crude oil prices, falling diesel supply specifically in the fourth quarter of 2018, yet still strong diesel demand. All these led to a rise in diesel crack spreads in 2018. Fuel oil price in 2018 averaged USD 66.8 per barrel, an increase from 2017 amid higher crude oil prices and reduced

export supply from the Middle East, particularly during the northern hemisphere summer months. All these led to fuel oil crack spreads remaining elevated in 2018. LPG CP price in 2018 averaged USD 541 per ton (Figure 3).

Dubai crude cracking margin in Singapore in 2018 averaged USD 5.8 per barrel, compared with a USD 7.1 per barrel averaged in 2017.

Asian petrochemical markets overall saw higher prices in 2018 – with the prices of petrochemical products remaining at high levels in the first three quarters, in line with crude oil and Naphtha prices, as well as strong demand for plastic products following China’s ban on imports of plastic waste. Petrochemical products prices, however, descended lower in the final quarter of 2018, in line with crude oil prices and short-term market situations. Specifically, High Density Polyethylene (HDPE) price averaged USD 1,330 per ton in 2018. As for Paraxylene (PX), factors supporting the price in 2018 also included the continuously high demand for polyester, and the new PX plants in Vietnam and Saudi Arabia were not able to run at full capacities. PX price in 2018 averaged USD 1,067 per ton (Figure 4).



Thailand Economic Review

Economic activity in Thailand continued to expand in 2018, mainly due to acceleration in growth of private investment, specifically inventory investment. Private consumption growth also accelerated, amid stronger and more broad-based income growth. Public spending, particularly the government's long-term infrastructure plans, finally gained some traction. Meanwhile, merchandise exports had contiuually expanded, then declined from last year due to the slowdown at world economy. The tourism sector continued to expand quite strongly, despite a drop in the number of Chinese tourists following the Phuket boat tragedy in July 2018. According to the Office of the National Economic and Social Development Council (NESDC), Thai economy expanded 4.1% in 2018, compared to a 4.0% growth in 2017. As for the stronger THB in 2018, Thailand's large current-account surplus, together with strong economic fundamentals including the high level of foreign exchange reserves relative to short-term external debt, resulted in exchange rates between the THB and USD dollar averaging THB 32.3 per USD in 2018 (Figure 5).



Thai economy expanded

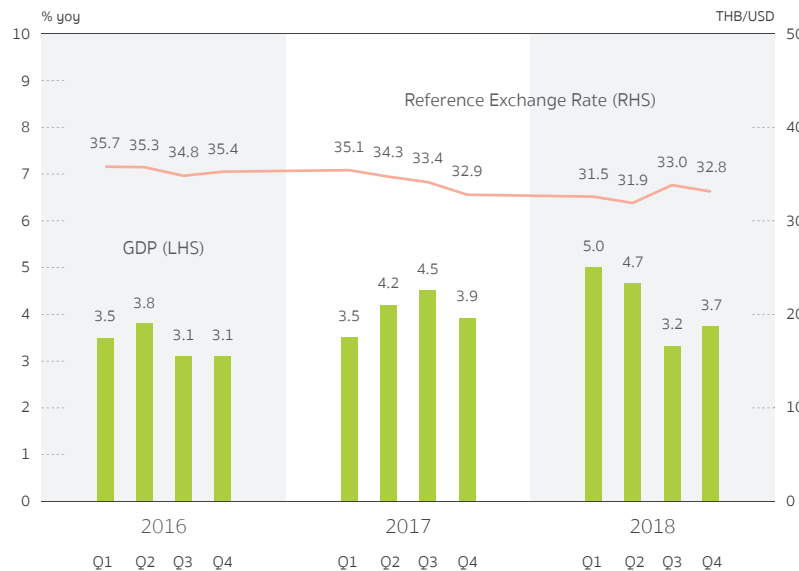
4.1%

Figure 5

Thai Economic Growth 2016 - 2018

Source: Office of the National Economic and Social Development Board (NESDB)/ Bank of Thailand (BOT)

	2016	2017	2018
GDP (% yoy)	3.4	4.0	4.1
Exchange mid-rate (THB per USD)	35.3	33.9	32.3



Domestic Petroleum Overview

The 2018 domestic primary commercial energy consumption, excluding renewable energy, rose 1.1% from 2017 to 2.14 million barrels per day (Figure 6). Consumption of oil rose 1.9% but the consumption of natural gas dropped 1.3%.

The 2018 domestic consumption of refined products surged 1.9% (Figure 7), including 3.1% rise in gasoline, 1.5% rise in diesel, 5.2% rise in aviation fuel, and 4.2% rise in fuel oil consumption. The increase in gasoline and diesel consumption was considered low, reflecting the economic volatility in the latter half of 2018. Higher tourist arrivals and the number of flights drove up the consumption of aviation fuel.

Consumption of LPG, however, dropped 2.4% due to lower consumption by the transport sector, while consumption in the industrial sector remained stable.

The 2018 domestic petroleum balance, shown in Figure 8, totaled 2.03342 million barrels per day, a 0.38% rise from the previous year. Oil and natural gas supply accounted for 60% and 40%. Of this total, 89% of oil was imported and 14% of natural gas was imported. Total sales of petroleum products rose 1.56% from the previous year to 1.79702 million barrels per day; 54% of these were refined products and 46% was natural gas. Exports of petroleum climbed 4.28% to 0.24254 million barrels per day.

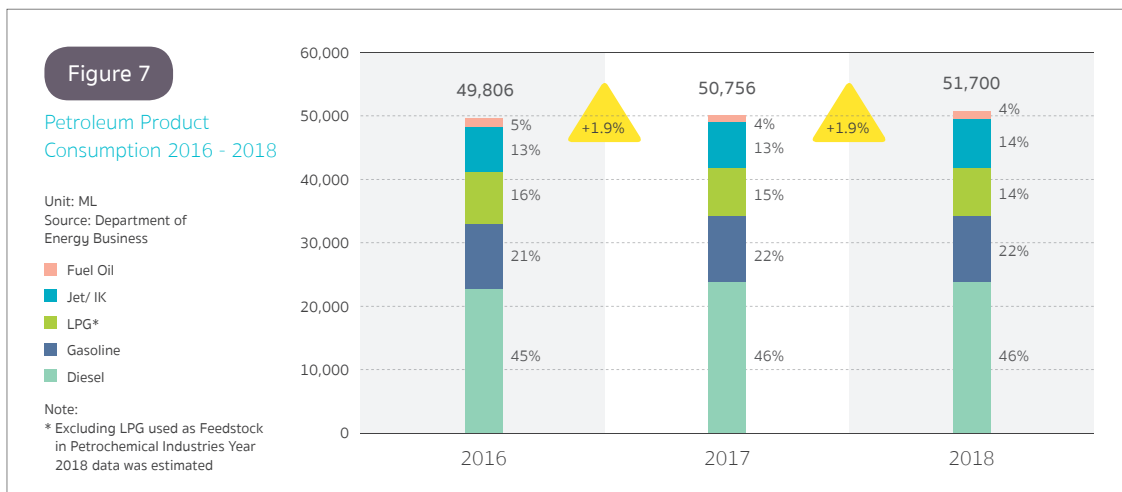
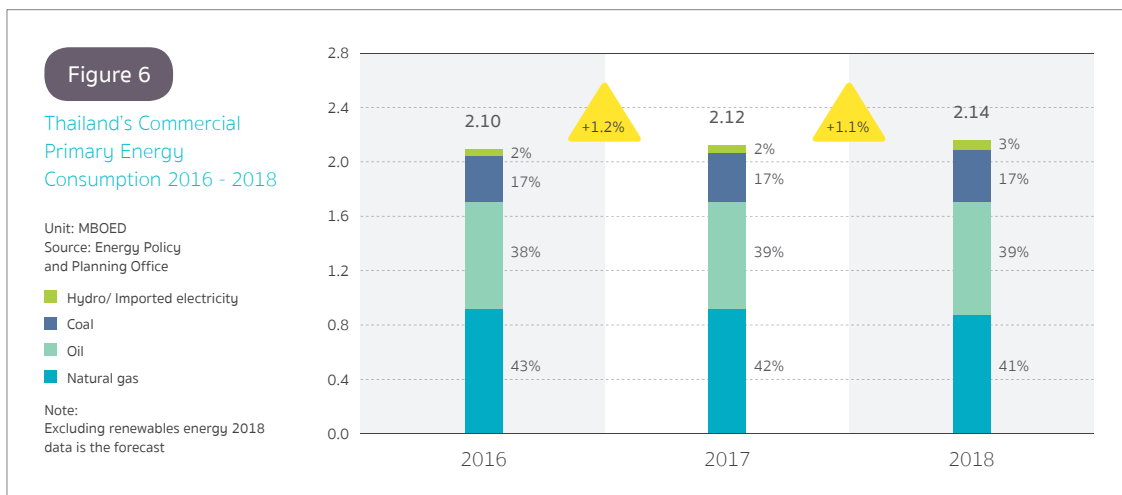


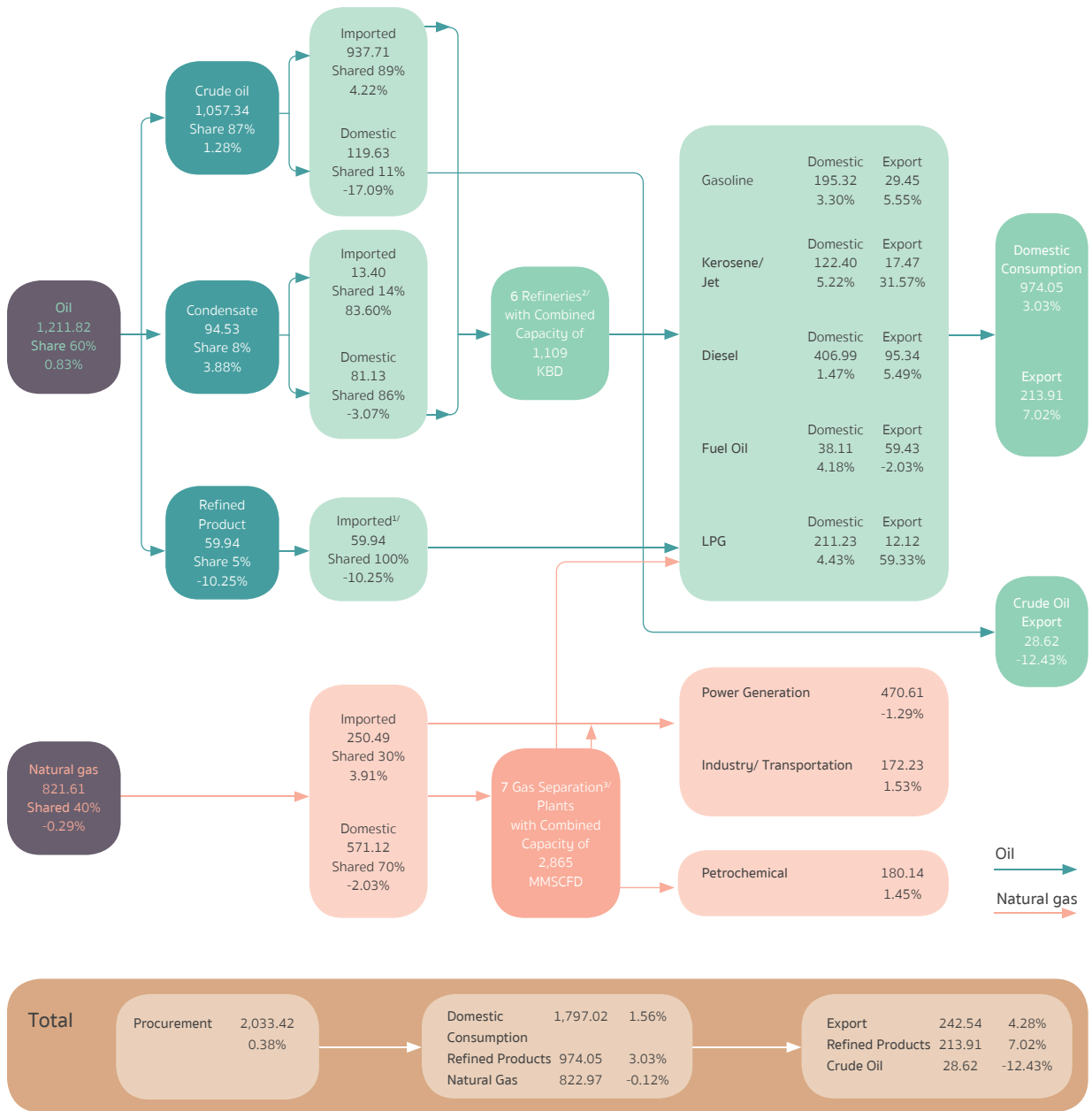
Figure 8

Thailand Petroleum Balance 2018

Unit: KBD

Procurement

Domestic Consumption/ Export



Source: Energy Policy and Planning Office, Department of Energy Business, Department of Mineral Fuels, and PTT

Note:

1/ Including LPG

2/ Capacity includes those of BCP, ESSO, IRPC, PTTGC, SPRC, THAIOIL and TOP 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.

Outlook for 2019

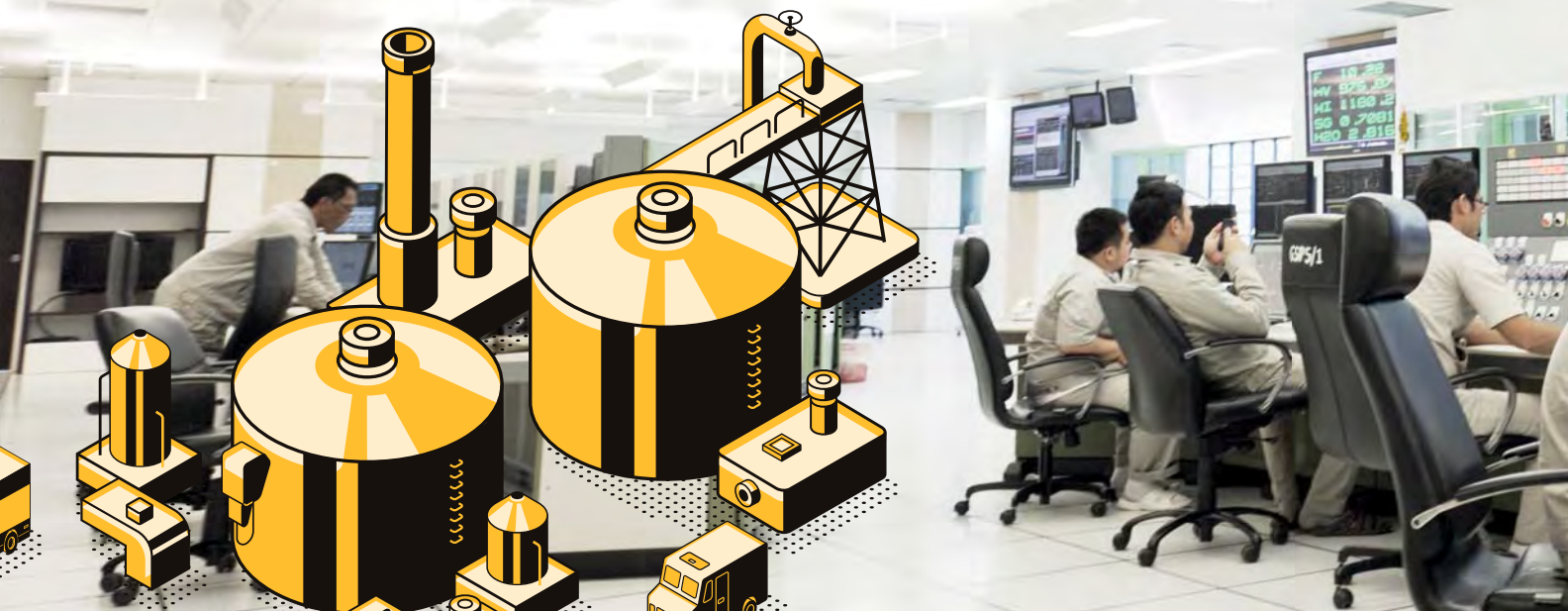
World Economic Outlook

Global economic growth is projected to slow further in 2019 – with US economic growth expected to decline amid fading tax-cut boost and the uncertainty over the trade conflict with China, despite continuing to benefit from the strong labor market. Meanwhile, economic recovery is expected to slow slightly in the euro area on the back of less accommodative monetary policy and home-grown political difficulties. In China, growth is expected to meet the government's target of 6-6.5%, amid Beijing easing off its debt crackdown campaign and more support measures being rolled out to mitigate threats to growth from the trade conflict with the US. Downside risks to the world economy include an escalating cycle of trade restrictions and retaliation, a surprise tightening of global financial conditions, and political uncertainty and geopolitical tensions and strife. The IMF in January 2019 forecasted global economic growth for 2019 at 3.5%.

According to IEA estimates
in February 2019, world oil
demand is expected to average

100.6

million barrels per day



Petroleum and Petrochemical Outlook

According to IEA estimates in February 2019, world oil demand is expected to increase 1.4 million barrels per day to average 100.6 million barrels per day in 2019, with emerging markets and developing economies, specifically China and Asian countries, being the key driver. Meanwhile, oil demand growth in advanced economies is likely to remain flat. As for oil prices in 2019, factors exerting upward pressure on the prices include the ongoing OPEC and non-OPEC deal to curb output, US sanctions on Iranian exports of crude oil and condensate, and geopolitical tensions in the Middle East; whereas factors exerting downward pressure include rising US crude oil exports, especially when the new oil pipeline will be finished in late 2019, and the global economic slowdown which is subject to significant downside risks. Dubai crude oil price is expected to average USD 60-70 per barrel in 2019, while Dubai crude cracking margin in Singapore is expected to average USD 5 - 6 per barrel.

As for petrochemical products, a price decline is foreseen in 2019 – with HDPE price expected to average USD 1,123 per ton on the back of rising US supply, and PX price expected to average USD 947 per ton amid new PX capacities being added in China and elsewhere.

Thailand Economic Outlook

The Thai economy in 2019 is expected to expand at a slightly slower pace than in 2018, following a slowdown in growth of merchandise exports amid weaker growth in key trading partners. Private investment growth is expected to slightly soften, due to potential destocking after an unusual inventory spike in 2018, whereas gross fixed capital formation should continue to grow, in line with the progress of the government's Transport Infrastructure Investment Action Plan and the Eastern Economic Corridor (EEC) Development Plan where more infrastructure projects are entering construction phase in 2019. As for private consumption, growth is expected to continue partly on the back of government support for low-income earners. Meanwhile, the tourism sector is likely to recover, as Chinese tourist arrivals rebound from the Phuket incident, amid the ongoing government tourism stimulus measures. Downside risks to the Thai economy include a greater-than- envisaged growth slowdown in key trading partners, delayed tourism recovery, and political transition and accompanying uncertainties. The NESDC in February 2019 projected the Thai economy to grow 4.0% in 2019. As for the value of the baht, analysts foresee a slight appreciation in 2019, with exchange rates between the baht and US dollar averaging THB 31.5-32.5 per USD, in line with a slower pace of the Federal Reserve's monetary policy normalization and rising market concerns over weakness in key economies.



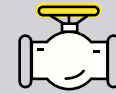
Nature of Business & Performance Summary

Throughout our four decades of business as the national energy company, PTT has remained true to its ways: relentless, comprehensive capability development while running integrated petroleum and petrochemical businesses with a focus on creating economic as well as social value, strengthening national energy security, achieving prosperity while contributing to peaceful co-existence in society, and striking a careful balance between business and the environment. All these propel the corporation to a Pride and Treasure of Thailand, poised to stride into the future.

Amid dynamic global changes, PTT has remained committed to its mandate of extending its businesses through innovation derived from its operated and invested businesses in pursuit of excellent performance.

PROSPERITY

GAS BUSINESS



Engage in natural gas supply procurement and gas-related value-added business. imported LNG

11.5 MMCF/D

expanded natural gas pipeline to Nakhon Ratchasima.

EXPLORATION AND PRODUCTION BUSINESS



Conducted through PTT Exploration and Production Plc. (PTTEP)

implemented 40 projects in **11** countries.

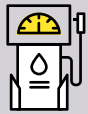
PETROCHEMICAL & REFINING BUSINESS



Refined crude oil into petrochemicals for distribution and provided port and tank facilities through 4 companies (GC, TOP, IRPC, PTT TANK)

7.7
million tons per year
of petrochemical sales.

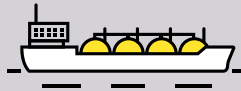
OIL BUSINESS



Through PTOR, Oil and Retail Business engaged in the distribution of petroleum products of **20,766*** million liters and non-oil goods to efficiently meet customers' demand while growing along with society

*excluding LPG, petrochemical, and lubricant.

TRADING BUSINESS

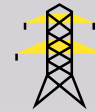


Procurement of crude oil and condensate from domestic sources.

10,057 million liters
From domestic sources
95% of the national output
Total

80,481 million liters
Across all regions.

POWER & UTILITY BUSINESS



Conducting electricity business and public assistance through GPSC. Producing electricity and public assistance to industrial clients as an Independent Power Producer (IPP), with power generating capacity of

1,955 megawatts
according to the shareholding ratio, and steam production of

1,585 ton per hours.



COAL BUSINESS

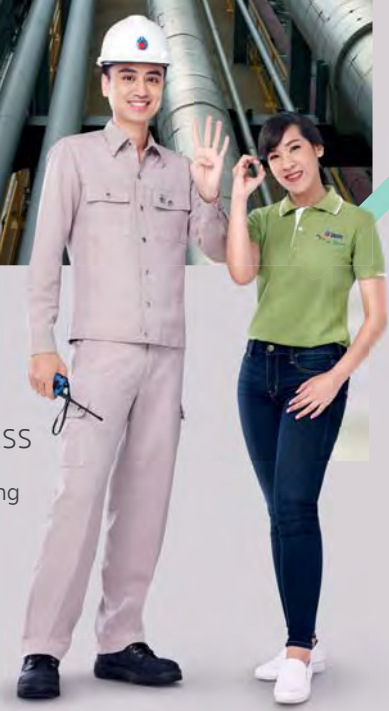
Operated in Indonesia through SAR
Sold a total of

8.2
Million tons of coal.

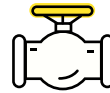


TECHNOLOGY & ENGINEERING BUSINESS

Technology and Engineering Business was founded on January 1, this year as a result of organization restructuring.



PTT-operated Businesses



GAS BUSINESS

The gas business unit's success in 2018 resulted from gradually rising prices of world oil and petrochemicals, whereas domestic gas costs are more stable. It also came from relentless process efficiency improvement at GSPs to prune operating expenses.

Gas Business Group

PTT engages in natural gas supply procurement, wholesale and retail gas sale, and gas-related value-added businesses through PTT Group. The supply includes domestic gas, imports from neighboring countries, and Liquefied Natural Gas (LNG) imports of sufficient volumes to meet the demand of major power producers through PTT's transmission pipelines, industrial users through distribution pipelines, and distribution to the transport sector through NGV service stations. PTT sells products derived from its invested Gas Separation Plants (GSPs) to supplement business value to the gas obtained from the Gulf of Thailand for petrochemical feedstock, and sells LPG for households, industry, and transport.

PTT also invested in LNG-receiving terminals through PTT LNG Co., Ltd., a wholly owned subsidiary of PTT, to provide service for LNG storage vessels and LNG re-gasification in order to accommodate PTT's LNG imports. The expanded phase 1 of the LNG Receiving Terminal Project was to raise the production capacity from 10 to 11.5 million tons.

The structuring of wholesale and retail gas sales prices comes under the Energy Industry Act, B.E. 2550 (2007). As a rule, the natural gas supply and wholesale business structures sales prices for power producers, together with gas transmission management, with a constant return as set by the public sector, whereas the price of the gas distribution to industrial customers is depended on the world fuel oil so as to be competitive with alternative fuels,

namely domestic retail fuel oil prices. For GSPs, products are sold as petrochemical feedstock, in turn based on petroleum and petrochemical prices, tied to world markets. As for LPG sold domestically as a fuel, the National Energy Policy Council (NEPC) on July 3, 2017, endorsed full liberalization of the LPG business. To elaborate, announced ex-refinery prices will be based on imported prices from world markets and import expenses for the benefit of overseeing retail LPG prices only. Currently, LPG exports requires permission from the public sector which collects contributions to the Oil Fund at THB 0.70 a kilogram; besides, a rate was set for contribution to the fund (or compensation for LPG derived from GSPs for use as fuel). In addition, the public sector requested PTT to continue its subsidy to ease impacts of LPG price rises for the household sector, specifically retail shops, street hawkers, and food stalls.

The gas business unit's success in 2018 resulted from gradually rising prices of world oil and petrochemicals, whereas domestic gas costs are more stable. It also came from relentless process efficiency improvement at GSPs to prune operating expenses. Business models have been added with a greater focus on serving third parties and modifying material and machinery procurement strategies, which enabled PTT to gain more revenue. This year's highlights are as follows.

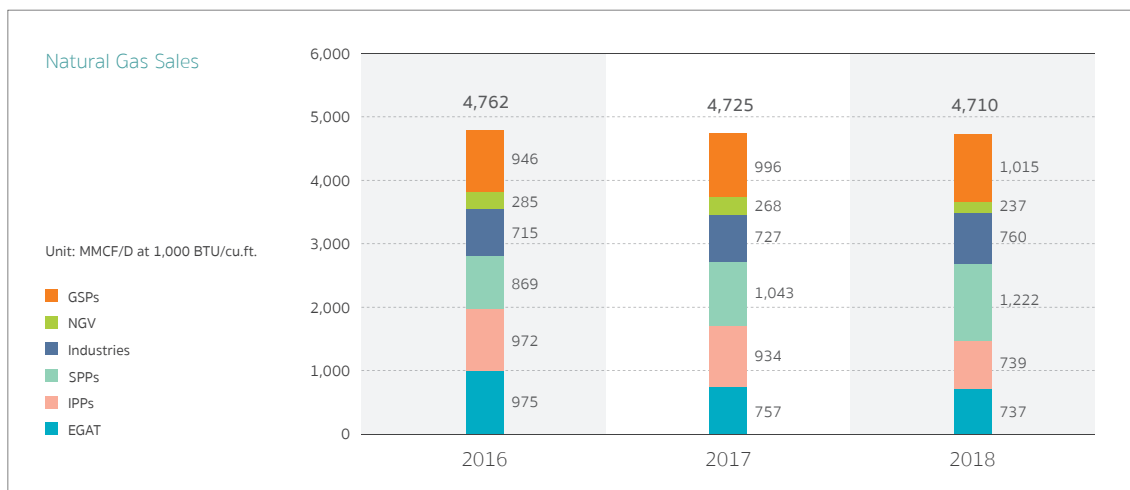


Natural Gas Procurement

Supply procurement totaled 4,708 MMCF/D, a 0.3% fall from last year at 4,720 MMCF/D, consisting of 3,276 MMCF/D from domestic sources and 1,432 MMCF/D from import, or an equivalent domestic/import ratio of 70:30.

Gas Sales to the Power Sector

Sales to this sector totaled 2,698 MMCF/D, about 57% of total sales, representing a 1.3% drop from last year (2,734 MMCF/D) due to the declining demand for power. Sales were completed to EGAT at 737 MMCF/D, or 16%; to 10 independent power producers (IPPs) at a total of 739 MMCF/D, or 16%; and to 68 small power producers (SPPs) at 1,222 MMCF/D, or 26% of the total sales.



Gas Sales to the Industrial Sector

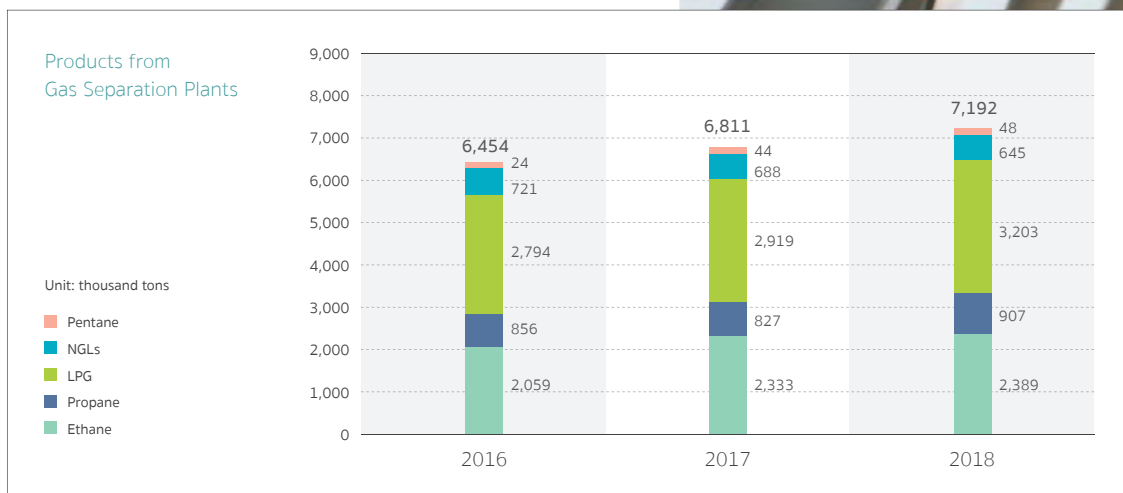
Sales to this sector totaled 760 MMCF/D, equivalent to 16% of the total sales, an increase of 4.5% from last year (727 MMCF/D). A total of 362 entities used industrial gases this year: 331 in the industrial group, 30 in the self-power-generating group, and one in the commercial group. Accounting for the rise was investment in gas distribution pipelines (extension) in Ratchaburi Industrial Estate, Ratchaburi, and that in the Eastern Seaboard Industrial Estate, Rayong, among others.

Sales of Products from GSPs

GSPs processed 1,015 MMCF/D of natural gas this year, or 22% of total sales, a 2% surge from last year (996 MMCF/D) because GSP Unit 5 gained 10 MMCF/D in productivity this year, beginning in the second quarter, which prompted sale of more products. This rise was aided by ongoing productivity improvement activities, which contributed to improved GSP performance through more effective and efficient processing.

Gas Sales to the Transport Sector

Sales to the transport sector averaged 237 MMCF/D (5%) of the total sales, recording a 12% decline from last year (268 MMCF/D) due to the plunge in world oil prices and in turn falling domestic gasoline and diesel prices. In the meantime, with the public sector's policy of NGV price floating and improved gas quality value, the NGV sales prices in this sector rise this year, causing more consumers to return to gasoline and diesel consumption.



Natural Gas Distribution Through Transmission Pipeline

This consists of offshore gas distribution which connects to gas fields in the Gulf of Thailand, eastern onshore gas distribution from the Gulf, western onshore gas distribution from Yadana, Yetagun, and Zawtika gas fields, located at the Thailand-Myanmar border, and distributes gas to power generators, GSPs, NGV stations, and industrial plants. This year's highlights are as follows.

- Nakhon Ratchasima Natural Gas Transmission Pipeline Project (Phase 2) was completed, with regular commissioning starting up on November 28. Gas entered the distribution system on December 14.
- The Wang Noi Compressor Station introduced gas to the system on October 20 and successfully tested its machinery, with a performance acceptance certificate (PAC) granted on December 21.
- The 5th Natural Gas Transmission Pipeline Project (Rayong to Sai Noi and North and South Bangkok Power Plants (Phase 1)) completed about 60 km out of 208 km of gas pipelines successfully laid from the Fifth Pipeline route (Phase 1). Phase 2 completed the beginning of gas pipeline construction at Amphoe Sai Noi, Nonthaburi, and Nong Chok, Bangkok, with the open cut method; preparation of areas and pipelaying machinery with HDD and boring was ongoing.
- The Natural Gas Transmission Pipeline Project from Block Valve Station No. 6 at Ratchaburi to Wang Noi was under construction, with about 32 km out of 120 km of pipelaying completed.



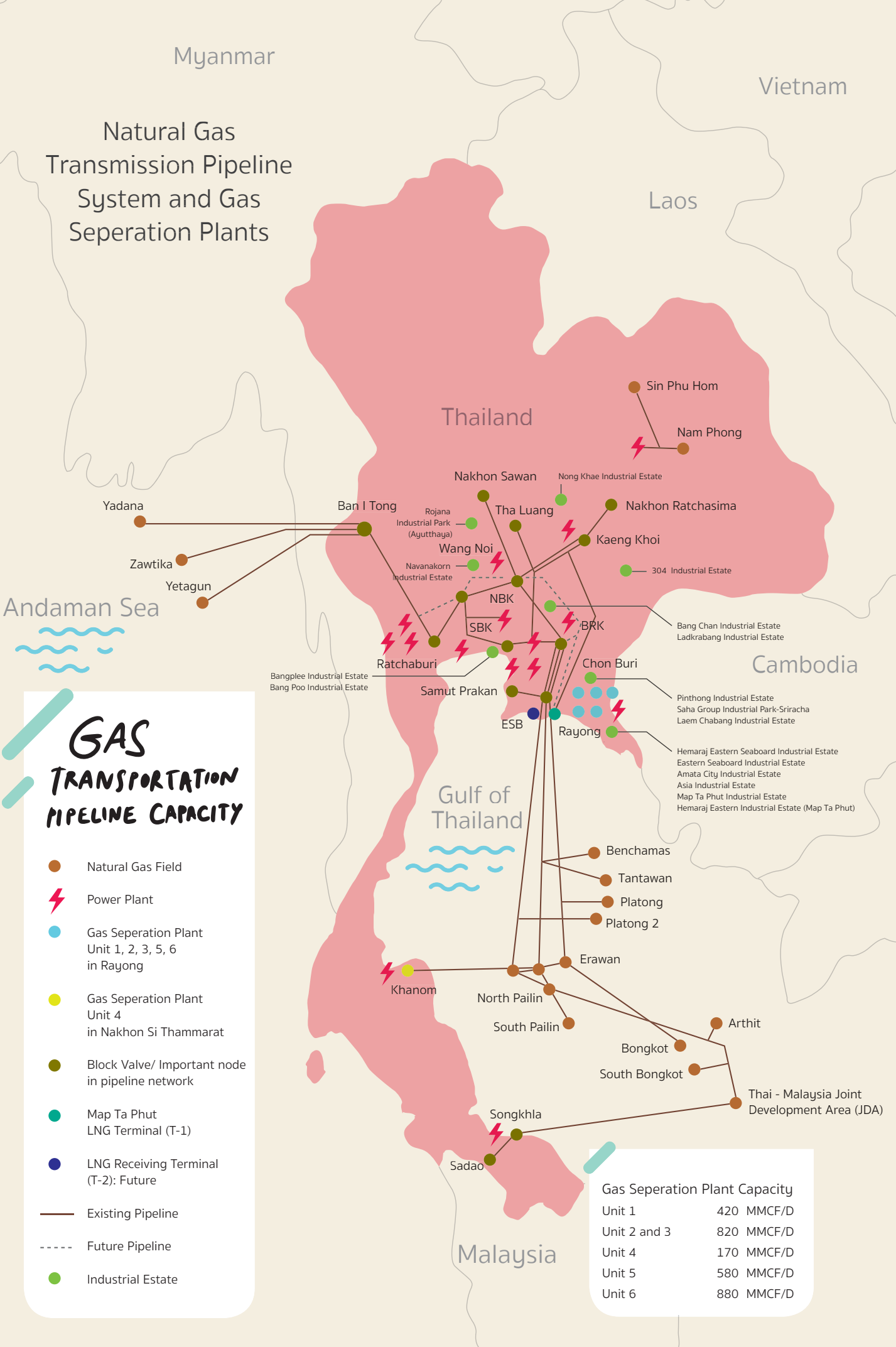
SMART WORK

Natural Gas Transmission Pipeline System and Gas Separation Plants

GAS TRANSPORTATION PIPELINE CAPACITY

- Natural Gas Field
- ⚡ Power Plant
- Gas Separation Plant Unit 1, 2, 3, 5, 6 in Rayong
- Gas Separation Plant Unit 4 in Nakhon Si Thammarat
- Block Valve/ Important node in pipeline network
- Map Ta Phut LNG Terminal (T-1)
- LNG Receiving Terminal (T-2): Future
- Existing Pipeline
- - - - Future Pipeline
- Industrial Estate

Gas Separation Plant Capacity	
Unit 1	420 MMCF/D
Unit 2 and 3	820 MMCF/D
Unit 4	170 MMCF/D
Unit 5	580 MMCF/D
Unit 6	880 MMCF/D



International Trading Business



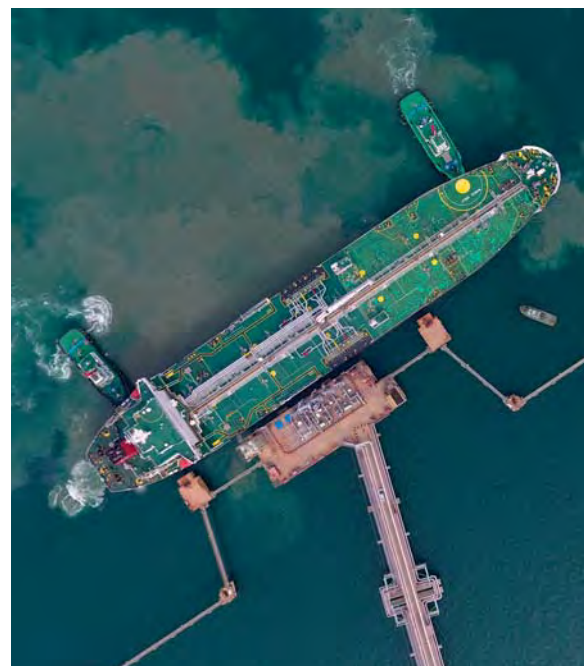
PTT operates fully-integrated international trading businesses to enhance national energy security in parallel with the expansion of trading bases to all regions of the world, covering supply procurement, import and export of crude oil, condensate, LPG, petroleum and petrochemical products, solvents and chemicals, and palm products like crude palm oil, refined palm oil, and palm kernel shells. It is also in charge of price risk management and international shipment in order to achieve its aim to become a leading multinational trading company.

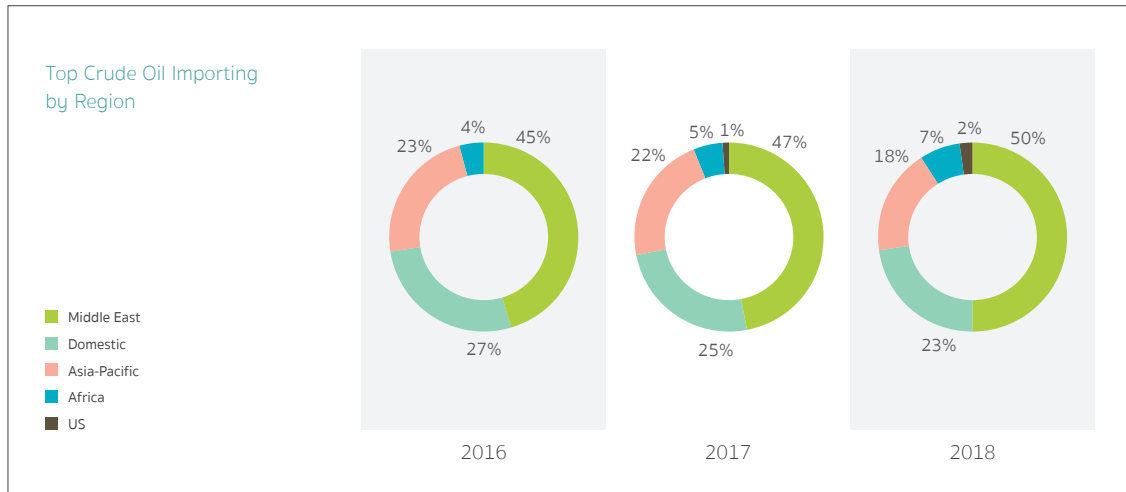
Performance hinges on the pursuit of opportunities for growing commercial trading beyond borders, it has therefore appointed subsidiaries and representative offices in commercial hubs around the world, including Singapore; Dubai, United Arab Emirates; Shanghai, China; Jakarta, Indonesia; and London, UK. As a result, PTT is managing business transactions around the world. Since international trading transactions are high in value, it applies risk control best practices adopted by leading international from Trading Houses. To elaborate, panels set policies and steer assorted risk management tasks and clearly divide work structure and roles (Front-Mid-Back) for checks and balances; PTT also applies digital technology to develop systems for transaction control, operation, and transaction risk control for transactions to enable quick and transparent transactions and efficient audit.

The success of the International Trading Business Unit stemmed from the relentlessly expanded trading networks all over regions, coupled with the operation of affiliates and representative offices located in strategic trading points across all regions and the Global Book Portfolio management model, which creates efficient trading transaction management in parallel with the application of expertise, skills, and experience in international transport service and efficient risk management. This year's highlights are as follows.

1) Adequate national energy supply

PTT secured its refineries and petrochemical complexes for enhancing energy security by sourcing domestic and overseas energy and allocating them in suitable proportions and quality. This year, the business unit procured 10.057 billion liters (95% of the total output) from domestic sources and secured crude oil and condensate from more diverse sources to ensure that Thailand continued to process quality crude oil. Particularly, PTT secured crude from the US as a refinery option thanks to similar properties to the traditional grades previously fed to domestic refineries, yet lower sulfur contents. This move accommodated the IMO Regulation, which requires no more than 0.5% sulfur content versus 3.5% currently, with effect from January 1, 2020. This year, a total of 33.192 billion liters (61% of Thailand's total imports) was imported.





Also, PTT also imported petroleum products to accommodate periodic rises in national energy demand, including imports of GBASE for gasohol production, LPG for the industrial, transport, and household sectors, and imports to meet demand in certain periods, such as during refinery turnarounds that called for diesel import, and fuel oil imports for reserve power generation. This year, a total of 658 million liters (19% of Thailand's total imports) was imported.

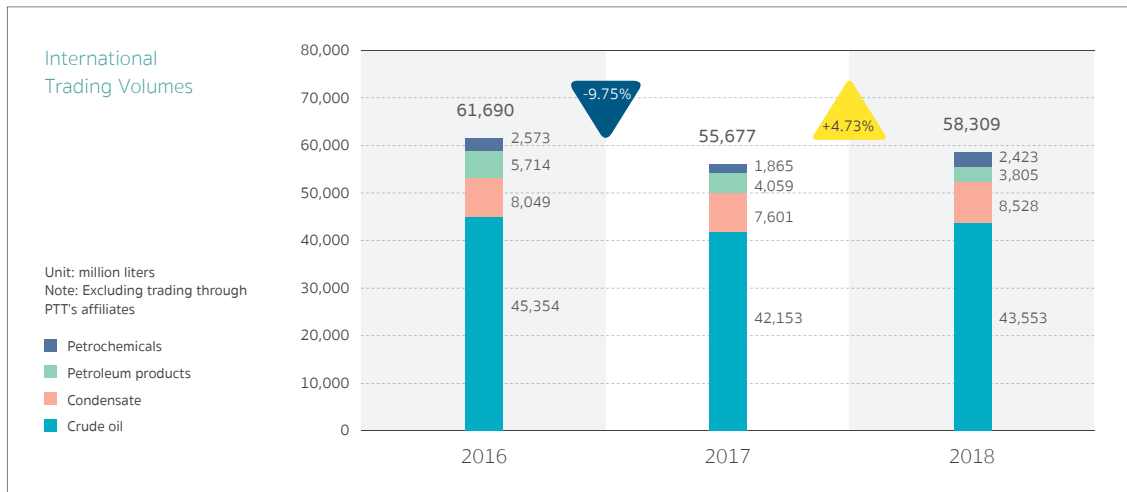
2) Value addition to national product surplus

PTT's instrumental role is also to provide balance of energy and create economic prosperity for Thailand, achieving through the collaboration among refineries, petrochemical complexes, and PTT's GSPs in exporting petroleum and petrochemical products beyond national demand, including fuel oil, low-grade diesel, LPG, NGL, olefins and aromatics products. The aim is to add value and remit export revenue to Treasury. This year, PTT exported 4.347 billion liters of petroleum products or about 35% of Thailand's total exports along with 1.963 billion liters of petrochemical products.

3) Expansion of trading bases worldwide

Besides the mission of enhancing national energy security through the procurement of products and value addition to surplus products by exporting, PTT also focuses on expanding international trading to all regions through affiliated companies and representative offices located in strategic energy trading locations, both eastern and western hemispheres, which track intelligence and movement round the clock. These offices also closely coordinate with PTT's customers and business partners and pursue opportunities for adding value and extend trading transactions in more and more new regions. PTT leverages the Global Portfolio management for trading transaction efficiency and maximum value addition for PTT Group. As a result, this year the out-out trading amounted to 33.412 billion liters, a 4.58% rise over last year (31.947 billion liters).





In 2018, the business unit posted a trade total of 58.309 billion liters, a rise of 2.632 billion liters (4.73%) from last year (55.677 billion liters), mainly due to rising import volumes of crude oil and condensate for domestic refineries and rising exports of petrochemicals. Trading was made up of 43.553 billion liters of crude oil, 8.528 billion liters of condensate, 3.805 billion liters of petroleum products and LPG, and 2.423 billion liters of petrochemicals and solvents. Then, there was trading in other commodity markets, including crude palm oil, refined palm oil, and palm kernel shells, whose total trade volume was 83,000 tons.

The year saw a total trade volume, incorporating transactions undertaken by international trading units of affiliated companies, of 80.481 billion liters (excluding connected transactions), 6.4% rise or 4.843 billion liters from last year (75.638 billion liters). The total trade volume undertaken by affiliated companies amounted to 25.366 billion liters, 10.04% rise (2.315 billion liters) from last year (23.051 billion liters)—a result of PTT’s commitment to expanding trading bases abroad for greater national energy security and pride of Thais in the international trade arena.





Technology and Engineering Business

This business was established on January 1, 2018, with the organization restructuring to engage in engineering, real estate, digital, and technology in support of PTT's business. It also develops New Business S-Curve businesses by linking the management of PTT's core business groups, R&D, and promotion of new business opportunities by leveraging PTT's assets, including land, buildings, and facilities for value addition thanks to technology and engineering excellence. The business also develops prototypes and pursues New Business S-Curve opportunities to accommodate domestic and international growth.

The Technology and Engineering Business consists of:

1) Innovation and Digital is made up of the Innovation Institute, which engages in R&D with a focus on strengthening technological aspects and upgrading researchers' capability to become experts in various fields, extension and development of digital knowhow into digital transformation. Innovation and Digital also strengthen the IT performance of various PTT business units through PTT Digital Solution Co., Ltd. Finally, to respond to megatrends it focuses on New S-Curve business development, including electricity value chains, robotics, and Artificial Intelligence (AI).

2) Engineering and Project Management is made up of engineering and construction project management, land management, project assessment regarding safety, the environment, society, and communities, and development of terms of reference in support of PTT's projects for objective and goal achievement.

3) Wang Chan Valley Development Project for EECi in support of the government's EEC. The business designs public utilities infrastructure and develops the area for commercial purposes in the form of a smart city to accommodate the country's research and innovation under the Thailand 4.0 policy.

Businesses invested through PTT Group companies



PTTEP operates domestic and international petroleum E&P and invests in exploration for petroleum deposits of crude oil and natural gas that are competitively priced to ensure Thailand's energy security.

Petroleum Exploration and Production (E&P) Business

PTT Exploration and Production Plc (PTTEP)

PTTEP operates domestic and international petroleum E&P and invests in exploration for petroleum deposits of crude oil and natural gas that are competitively priced to ensure Thailand's energy security. It sells petroleum outputs from domestic and regional projects, most of them in the form of natural gas, primarily to the domestic market.

PTTEP's performance is primarily subject to the world oil price, petroleum exploration and field development success, efficient E&P cost management, investment opportunities, and corporate competency development.

In 2018, PTTEP was committed to conducting its business for continual growth and energy security in accordance with

the Coming-Home Strategy, which means PTTEP will focus its investment mainly on geographical areas of expertise. As seen from the success of winning the concession bidding for Bongkot and Erawan fields, including the purchase of an additional 22.2222% interest in Bongkot. In addition, PTTEP has adjusted its investment plan in non-strategic areas by divesting its interests in Montara Field, Australia, that has been producing for a long time at a high production cost. For long-term growth, PTTEP accelerated development of projects awaiting the final investment decisions (FID); for example, the Mozambique Rovuma Offshore Area 1 project. The FID is expected within the first half of the 2019. With regard to



exploration, PTTEP developed plans to accelerate exploration activities in the Republic of the Union of Myanmar (Myanmar) and Malaysia, which will increase its petroleum reserves. In addition, PTTEP is looking for merger and acquisition (M&A) opportunities in regions where PTTEP commands expertise and other high-potential areas, together with strategic alliances.

This year PTTEP proudly presented a net profit of USD 1.120 billion, rising more than 89% from the previous year. This is mainly due to the profit from normal operations, which increased to USD 1.215 billion from the previous year (USD 836 million), resulting from the volume of petroleum sales, the average selling price, and increased oil prices in the world market in 2018. However, unit costs have increased to USD 31.7 per Barrel of Oil Equivalent (BOE) due to higher royalty fees based on the average selling price and an increase in depreciation due to additional stake purchases in the Bongkot project. PTTEP has operated 40 projects in 11 countries in the following;

Projects in Thailand

PTTEP has implemented 16 domestic projects, mostly in the production phase and operated in the Gulf of Thailand and onshore. In 2018, the average domestic sales volume was 246,457 Barrels of Oil Equivalent per Day (BOED) or 81% of the total sales volume. The major activities included Bongkot achievement in maintaining planned production levels. PTTEP acquired an additional 22.2222% interest in the middle of this year and commanded 66.6667% interest in the current joint venture. In December, PTTEP won the concession bidding for the Bongkot field and the Erawan field, whose contracts will be expired during 2022 - 2023. The project S1 has continuously developed production wells to maintain production levels, whereas Ubon Project (under Contract 4) was in preparation for development, which is expected to commercialize petroleum by 2023.

International Projects

Projects in Southeast Asia

PTTEP has carried out 15 projects in the region, located in Republic of the Union of Myanmar, Socialist Republic of Vietnam, Malaysia and Indonesia. This year the average sales volume from all projects in Southeast Asia was 51,571 BOED, representing 17% of the total sales volume. The projects in the production phase included Zawtika project, had completed

production well drilling on all four platforms of Phase 1C and continued drilling to maintain production levels.

Most projects in exploration are located in Myanmar, both onshore and offshore. Myanmar M3 Project's field development plan, submitted in 4Q2018, is awaiting approval from the Myanmar government. The Sarawak SK-417 Project were in progress with geological and petroleum potential data processing. Field development plans of projects offshore Vietnam, namely Vietnam B, Vietnam 48/95 and Vietnam 52/97, had been approved. Currently, PTTEP is in commercial negotiation for the FID. It is expected that the commercial production of petroleum will begin in late 2022.

Projects in Australasia

PTTEP has one project in the region, namely PTTEP Australasia, comprises of 8 concession blocks.

Montara field is the only project in the production phase with 5, 368 barrels per day in 2018. PTTEP completed divesting its interest in the field to JadeStone Energy Company on September 28. Currently, it was in the process of operatorship transfer to the buyer, which will be effective once approved by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), expected by 2019.

The Cash Maple Field, which was in the exploration phase, had already completed its pre - FEED study) and is now identifying appropriate project development approaches.

Projects in the Americas

PTTEP carries out five projects in Americas, located in Canada, the Federal Republic of Brazil and Mexico. All projects are in the exploration phase.

The Mariana Oil Sands Project is located in Alberta, Canada. The Thornbury field Phase 1 development plan had been approved by the Alberta government in May. It is currently identifying appropriate project management approaches.

There are two joint venture projects in Brazil, namely the Barreirinhas AP1 Project, are being studied the geological and petroleum potential.

In Mexico, there are two joint-venture projects, namely Mexico Block 12 (2.4), and the Mexico Block 29 (2.4). PTTEP had submitted exploration plans to the National Hydrocarbons Commission of Mexico in 4Q2018. Approval is expected by the first quarter of 2019.

Projects in Africa

PTTEP has three projects in the region located in the People Democratic Republic of Algeria and the Republic of Mozambique.

The Algeria 433 Project and Algeria 416B Project are in the production phase. This year, the average production output was 17,350 barrels per day.

The Algeria Hassi Bir Rekaiz Project development plan was approved by the Algerian government in April 2018 and divided into two phases. The first phase has a capacity of 10,000 - 13,000 barrels per day, expected to start production in 2020. Phase 2 will be started production in 2024, which will increase production capacity to 50,000 - 60,000 barrels per day.

The Mozambique Rovuma Offshore Area 1 Project is a large LNG project under the exploration phase. Significant progress in 2018 included the approval by the Council of Ministers on the Golfinho - Atum gas field plan of development in February 2018, contract negotiations for the construction of an onshore LNG plant and the selection of contractors for offshore installation. In addition, the project was in the process of signing long-term LNG sales and purchase agreement with the buyers, including negotiating a project finance loan agreement with financial institutions to support the FID in the first half of 2019. The project is expected to be commercially produced in 2024 with a capacity of 12 million tons per year.

Portfolio Management

This year, PTTEP continued implementing a strategic plan in accordance with the 3R guidelines, namely RESET, REFOCUS and RENEW to increase its competitiveness, promote sustainable growth, and prepare for challenges of the future energy business.

RESET

This strategy is to increase the volume of natural gas production from major projects and maintain competitiveness.

REFOCUS

This strategy is to grow business by focusing on areas where PTTEP has expertise.

RENEW

This is a strategy for sustainability by increasing technological potential and seeking other business opportunities.

PTTEP intends to invest in new businesses, including businesses related to energy. Current efforts also include organizational restructuring and work process redesign for more flexibility and efficiency in line future growth plans. The new organization structure is effective from 2019 onward.

PTT Global LNG Co., Ltd. (PTTGL)

PTT and PTTEP, represented by PTTEP Business Center Co., Ltd., formed a 50:50 joint venture named PTT Global LNG Co., Ltd. (PTTGL), on June 23, 2017, to coordinate cooperation among PTT Group on investment expansion and an integrated LNG business across the value chain. Its first project was the 10% equity acquisition of Petronas in the MLNG Train 9 in Malaysia, an LNG liquefaction plant, representing a business platform for future investment growth in Malaysia as well as pursuit of investment opportunities in other petroleum deposits.



RESET
REFOCUS
RENEW

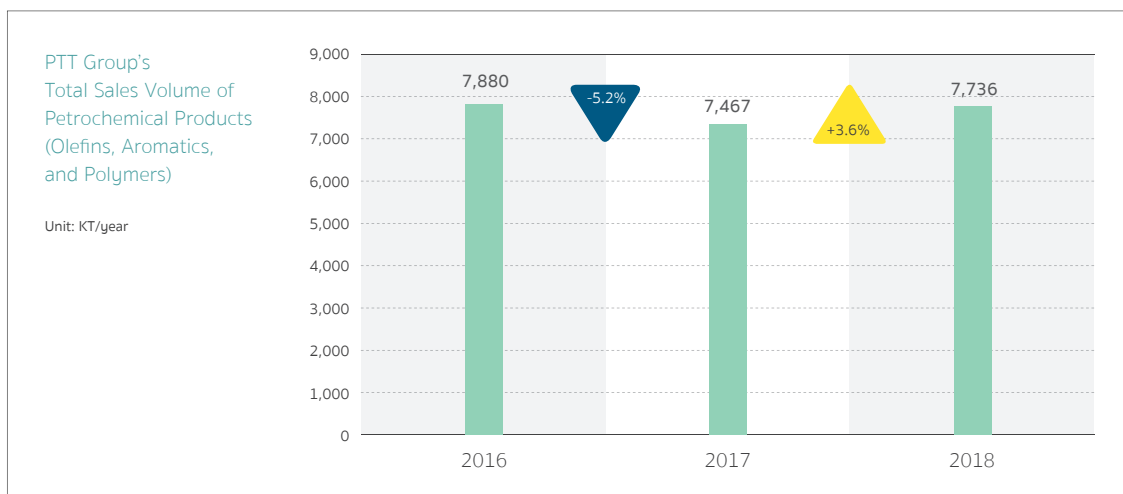
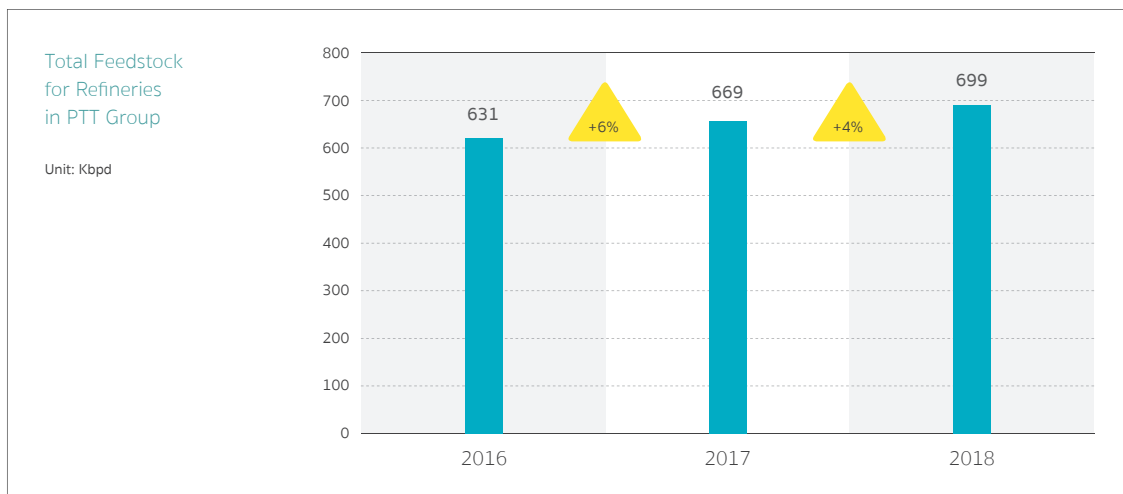


Petrochemical and Refining Business

PTT invests through four PTT Group companies, namely PTT Global Chemical Plc (GC), Thai Oil Plc. (TOP), IRPC Plc. (IRPC), and PTT Tank Terminal Co., Ltd. (PTT Tank). The scope of business ranges from oil refining, production and sale of upstream, intermediate, and downstream petrochemicals together with various polymers (olefins and aromatics), in addition to marine terminal and tank services. The petrochemical and refining business evolved new product capacities and services to add business values, domestic and international while pursuing investment opportunities to ultimately enhance PTT Group's competitiveness.

The performance of the group is primarily subject to the state of world economy, feedstock and product price margins in the world market, which are a function of world supply and demand as well as year-end inventory (stocks).

Summary of Petrochemical and Refining Investment Portfolio 2018



In 2018, all feedstock for the petrochemical and refining business units feeding to PTT Group's oil refining totaled 669 KBD (thousand barrels per day), a 4% rise from last year, mainly due to IRPC's planned major turnaround in Q12017. Total petrochemical sales topped 7.736 million tons, a 3.6% rise, as the second aromatics complex of GC underwent planned turnaround from June 4 to July 18, 2017, thus constantly raising processing efficiency. GC began commercial production at LLDPE Plant 2 with an installed capacity of 400,000 tons per year (TPA) in March 2018. Meanwhile, the ethylene oxide group registered a hike, going through the year without a turnaround. Finally, IRPC produced a rising volume of polypropylene due to the commercial start of its PPE and PPE plants in late 2017.

The year saw rising production and sales, coupled with higher ongoing execution efficiency across the organizations, value addition and cost reduction of companies in the group (synergy value) under the PRISM (Petrochemical and Refining Integrated Synergy Management), the PTT Group Operational Excellence Project with application of best practices, Group logistics management, and value chain optimization. At the same, it saw a drop in the margin between gasoline and fuel oil versus Dubai prices while the crude premium rose together with impacts of the plunging crude prices toward the fourth quarter of the year. The bottom line is then a net profit for the Petrochemical and Refining Group of THB 58.324 billion, a drop of THB 17.556 billion.

A summary of investment portfolio adjustment, expansion/are capacity rise by PTT and its Petrochemical and Refining Group are as follow.

PTT Global Chemical Plc. (GC)

- The Olefins Reconfiguration Project (ORP), which raises the olefins capacity by 750,000 TPA from 2,988,000 TPA to 3,738,000 TPA at an investment of THB 35.657 billion, is due for commercial operation by 2020.
- Engaged in an investment project in specialty chemicals through joint investment with Kuraray and Sumitomo, forming Kuraray GC Advanced Materials, a joint venture, to engage in the production of advanced engineering plastics in Thailand, namely high-heat resistant polyamide-9T (PA9T) at 13,000 TPA and hydrogenated styrenic block co-polymer (HSBC) at 16,000 TPA. The plant is due for commercial operation in 2022.
- Engaged in an investment project for the production of rotomolding compounds through share acquisition from Revolve Group Limited (RGL) of the UK to focus on investment in performance chemicals based mainly on LLDPE.
- Engaged in the Propylene Oxide Project and Polyols Project, under the Polyurethane Business, regarded as performance materials and chemicals. The move completed the international of polyurethane products, with rising market demand in line with the global economy posed by the automotive, construction, electronics, and electrical appliance industries. A subsidiary called GC Oxirane Co., Ltd. (GCO) and a joint-venture company called GC Polyols Co., Ltd. (GCP), were formed by GC and Sanya Chemicals Industries (SCI) and Toyota Tsusho Corporation (TTC) of Japan to engage in the PO and polyol business. The PO/Polyols project value amounted to THB 32 billion, and commercial production is due in 2020.
- Engaged in the Purified Terephthalic Acid (PTA) business and polyethylene terephthalate resin (PET). Here, GC and TOC GC (of GC Group) joined hands with Mitsui Chemicals Inc. (MCI) in a joint venture in Siam Mitsui PTA Co., Ltd. (SMPC) and Thai PET Resin Co., Ltd. (TRPC), to produce and distribute PTA and PET. GC held 74% and TOCGC held 26% in adding value to paraxylene and monoethylene glycol (MEG).



OIL BUSINESS

Thai Oil Plc. (TOP)

- Proceeded with the Clean Fuel Project (CFP) to hike its competitiveness through improved process efficiency to add product value by raising its capacity from 275 KBD to 400 KBD, expected to take five years, with completion expected in 1Q2023. The Cabinet also endorsed Thaioil's renewal of its 1,499-rai lease on Treasury Department land, site of its refinery, located on Sukhumvit Road, Tambon Bang Phra and Tambon Thung Sukhla, Chon Buri. The lease was due to expire on September 10, 2022, and will now expire on September 10, 2052. The present value of the rent (as of September 2022) is THB 12 billion.

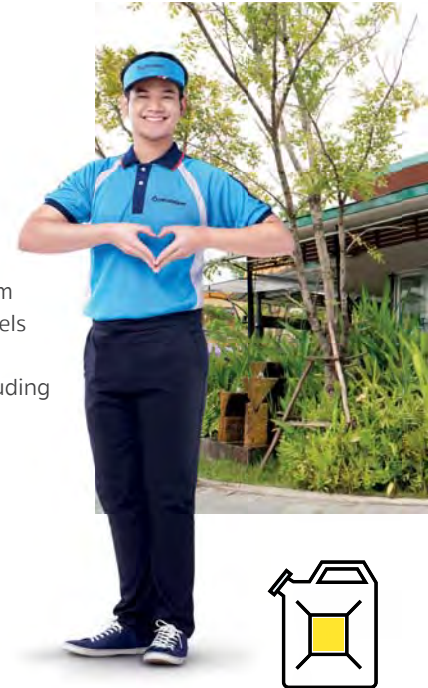
IRPC Plc. (IRPC)

- Engaged in a joint venture with WHA Rayong Industrial Estate in setting up 2,152-rai industrial estate in the EEC zone, Rayong, with a registered capital of THB 650 million, with WHA holding 60% and IRPC 40%.
 - Invested in a business of plastic product trading through the E-Commerce system in China and in a subsidiary in Thailand:
 - Guangzhao Saiju Performance Polymers Ltd. (GZSJ) of China, engaging in trade of plastics via the E-Commerce platform and management of the IPLAS platform
 - A joint-venture company was set up in Thailand with GSZJ to engage in trade of plastics products via the E-Commerce platform in Thailand.
 - The Maximum Aromatics (MARS) project under a license agreement and engineering agreement with UOP LLC will support IRPC's increase in capacity from 17% to 27%. A final investment decision (FID) is due by 2019.

PTT Oil and Retail Business Plc. (PTTOR)



Distributes petroleum products of liquid fuels (including LPG) and other products (including lubricating oil) and non-oil products.



The oil business distributes petroleum products of liquid fuels (including LPG) and other products (including lubricating oil) and non-oil products.

All these are sold through two major distribution channels:

- 1) Retail sale of products and services to consumers, conducted through service stations and outside them. This year PTT evolved its service station format to Living Community, with service stations serving as a community hub, filled with engagement among people and their lifestyles together with good responses to various needs of consumers. In addition, PTT created new PTT-run retail businesses and pursued business partners to jointly develop products and services, create jobs, and extend care for Thais to grow together in a sustainable way. The company provided space for



communities to put quality products on sale direct to consumers at service stations, supporting distribution of community products. PTT also relentlessly engaged its consumers through the PTT Blue Card, whose membership has risen. It has developed customized relationship for each group of members with different basic characteristics and needs by analyzing in-depth data from Big Data. PTT also introduced new benefit schemes under which members earn privileges from leading stores.

2) The commercial market, sold to the aviation group, ocean liners, and industries. PTTOR sells LPG to household and transport customers, as well as lubricants. It sell products to customers under Article 7 of the Fuel Trade Act. Finally, it exports products.

The oil business has become more liberalized and highly competitive under regulation by several laws, including the Commercial Competition Act B.E. 2542 (1999), the Fuel Control Act B.E. 2542 (1999), and the Fuel Trade Act B.E. 2543 (2000). As of December this year, PTT was one of the 46 Article 7 traders registered with the Department of Energy Business. Its performance outcomes are dictated by the fluctuating world oil price, the state of economy affecting consumers' purchasing power, and the success of retail business growth, which is steadily growing.

The business also invests in subsidiaries in other countries to engage in fuel and product distribution.

The business engages in other retail non-oil businesses, primarily consisting of Café Amazon coffee shops, convenience stores, and food and drinks, which include Café Amazon outlets and convenience store business in other countries.

On June 18, 2018, PTT signed a business transfer agreement with PTT Oil and Retail Marketing (PTTOR), for assets and liabilities of the former Oil Business Unit and the shares of related companies to PTTOR. It began the process of assets and liabilities transfer and shares on July 1, 2018. Certain assets related to PTT's oil business were not, however, transferred to PTTOR; these included the land that PTT received from the Fuels Organization, its rights and obligations concerning sale of oil and petroleum products to Thai government agencies under the Procurement and Material Management Act B.E. 2560 (2017), the LPG Terminal in Chon Buri (Khao Bo Ya), the facilities at Ban Rong Po, Sriracha Terminal, and the litigations involving PTT concerning the oil business that the court had registered for handling before the business transfer date. To this end, PTT has set up a unit to look after the assets and run the business portion not yet transferred to PTTOR. Note that the sales volumes of products and related products still remaining at PTT are small.

Global Power Synergy Plc. (GPSC)

The company operates the production of utilities (electricity, steam and demineralized water) for industrial customers and conducts independent power generation (IPP) with the Electricity Generating Authority of Thailand (EGAT) District Cooling System and Power Plant Company Limited (DCAP) produces electricity and cold water for Suvarnabhumi Airport and Thaipower Co., Ltd. (TP) operates electricity production for EGAT and sells electricity and steam directly to customers in the Thaipower Group.

The success of the electricity and public utilities business comes from the management of various production units that ensures reliability and efficiency, including the operations of affiliate companies that are superior to the plan. Furthermore, the company manages its operations to reduce operating costs and consulting fees. The operating results of 2018, GPSC and its affiliates (Consolidated financial statements) showed a net profit of 3.359 billion baht, which is a 184 million baht (annual performance 2017 net profit 3.175 billion baht) increase from 2017.



Other Business:

Energy Complex Co., Ltd. (EnCo)

Provides office space as well as physical resource management services and supports integrated property business development for PTT Group.



PTT Energy Solutions Co., Ltd. (PTTES)

Provides engineering technical consultancy services.

PTT Digital Solutions Co., Ltd. (PTT DIGITAL)

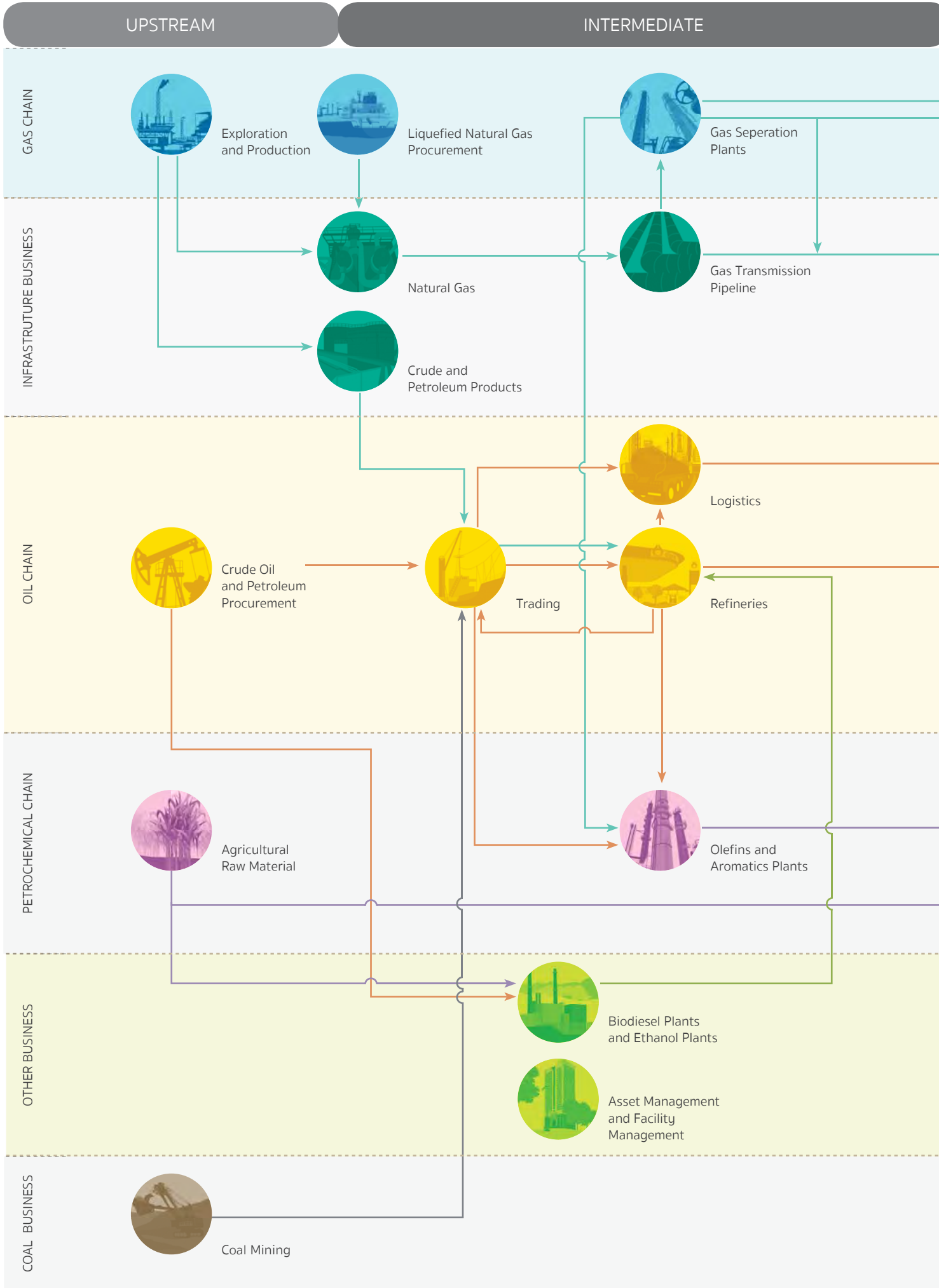
Provides ICT services whose business success is subject to service quality satisfying customers' needs.

PTT Global Management Co., Ltd. (PTTGM)

Previously, PTT invested in the coal business through PTT Energy Resources Company Limited (PTTER) by conducting coal mining operations in the Republic of Indonesia through Sakari Resources Limited (SAR). In 2017, PTT Global Management Company Limited (PTT Global Management Company Limited: "PTTGM") became the core company supporting PTT's investment both domestically and internationally by transferring the group of coal-based businesses under the umbrella of PTTGM in 2018. PTT approved PTT Mining Limited (PTTML)'a purchase of SAR shares from minority shareholders who want to sell their shares, resulting in PTML holding additional shares in SAR. Increased from 95.45% to 95.82%.

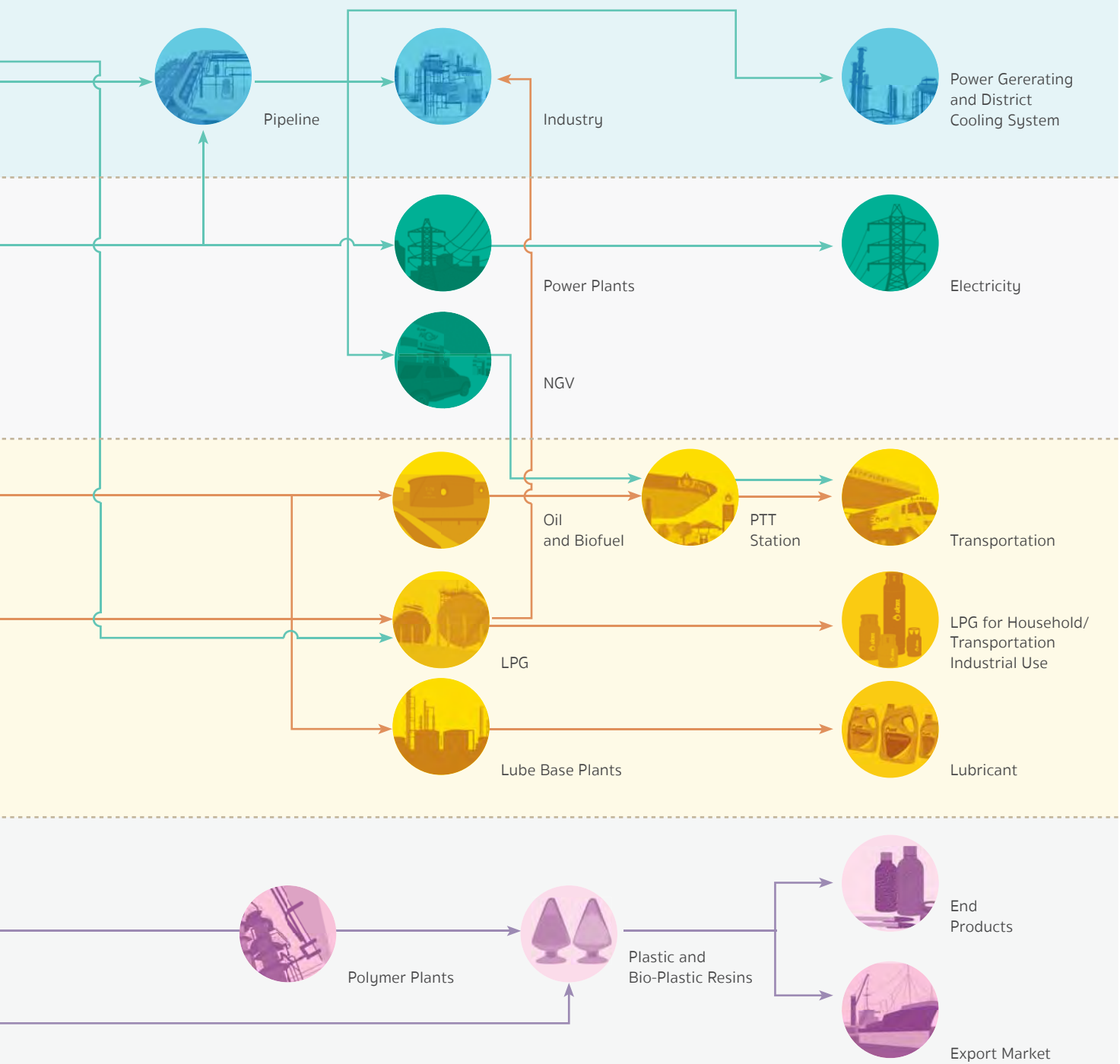
In 2018, the coal business had a total sales volume of 8.2 million tonnes, down from 2017, which had a total sales volume of 8.3 million tonnes, mainly selling to coal users in Asia, such as Hong Kong, Taiwan, Korea, Japan, China, India, Malaysia, Indonesia, and Thailand, as well as the United States. The operating results of SAR's coal business showed \$ 90 million in net profit, which improved from 2017, with a net profit of US \$ 89 million. This is the result of Newcastle coal reference price (NEWC index) in the world market increasing from 2017. In 2018, SAR continuously focused on controlling the operating expenses, as well as adjusted sales and marketing plans, including coal blending to increase coal selling prices. The company is also seeking opportunities to invest in additional coal businesses to increase coal reserves, which will enable the company to maintain its competitiveness in the coal business.

Create Value through Business Chain



DOWNSTREAM

END CUSTOMERS



Sustainability Management/
Consultancy, Engineering
and Project Management

PTT 2018 Milestones

January

- Started delivering natural gas to small power producer (SPP) Gulf TS 4 Co., Ltd., at 17 MMCF/D and delivering CNG to industrial customer Canadian Solar Manufacturing (Thailand) Co., Ltd., at 0.15 MMCF/D.
- Joined forces with the Rubber Authority of Thailand (RAT) to establish a free-of-charge point to sell processed rubber at participating PTT gas stations, creating distribution channels and convenience for the public along with knowledge sharing and innovation to upgrade products to international standards.
- In cooperation with PTT Digital Solutions Co., Ltd., completed the development of the Commodity Trading and Risk Management System (CTRM) to upgrade the IT system to support business expansion in volumes, trade, management complexities, price risks, and new product trade in the future. It also enhanced the commercial risk control system that is fast and concise to support the International Trading Business Unit's sustainable growth.
- Organized the "Join forces to buy rice from farmers" event for a second year to increase rice selling channels for Thai farmers, alleviating product supply glut, helping farmers to learn and develop a rice management system as well as helping consumers buy low-cost but high-quality rice from farmers directly. There were 768 PTT service stations throughout the country participating in this event.

February

- Began delivering 15 MMCF/D of commercial gas to Amata B. Grimm Power (Rayong 3), which is an SPP customer.
- Signed an energy cooperation agreement with the Electricity Generating Authority of Thailand (EGAT), a milestone collaboration between two Thai state enterprises under the supervision of the Ministry of Energy. The main mission is to forge and sustain power and energy security for the country. It is considered the starting point for Team Thailand for Energy Business to jointly maintain energy security as well as energy business development and energy innovation to develop the national economy and improve the well-being of people.



Join forces to buy rice from farmers



PTT's commissioning JSC OGCC KazStroyService (KSS) as the contractor of the 5th Natural Gas Pipeline Project (Phase 2)



Signed MOU with ONEPP in the preparation of EIA Guidelines for Business Development in AEC

- Launched PTT SPEED PAY for the first time at PTT service station, Ministry of Defense (Bangna-outbound), increasing speed and safety of service, reducing the time for refueling and paying cash by more than 20%.
- Started selling PTT UltraForce Diesel, the first product in Thailand of the Euro 5 standard with a sulfur content of below 10 ppm. It boasts powerful cleaning features and restores the cleanliness of fuel injectors in a short time and reducing emissions of fine particulates (PM 2.5 microns).

March

- Started supplying natural gas to Gulf NC Co. Ltd., an SPP customer, at 17 MMCF/D.
- Signed a contract to sell LNG to Big Gas Technology Co., Ltd. (BGT). This was the first time for PTT to sign an agreement to sell LNG to private traders for reselling to industrial plants outside pipeline routes. This contract provides an opportunity for industries to use LNG gas, a clean fuel, as an alternative fuel replacing LPG and fuel oil, thus reducing fuel costs by 3-5%.
- Together with the State Railway of Thailand (SRT), conducted testing B10 biodiesel with train engine of the Ban Laem – Mae Klong line to support the public policy to increase the proportion of biodiesel from the current ratio (7%) (B7) to 10% (B10). The new fuel proportion will reduce the amount of palm oil on the market by 36,000 liters and reduce emissions of fine particulates (PM 2.5 microns) as well.
- Signed a crude purchase agreement with Brunei Shell Petroleum the eighth consecutive year and enhance energy security for the country.
- The Board of Directors of PTT approved PTT's commissioning JSC OGCC KazStroyService (KSS) as the contractor of the 5th Natural Gas Pipeline Project (Phase 2).
- Signed a memorandum of cooperation with the Office of Natural Resources and Environmental Policy and Planning (ONEPP) in the preparation of an EIA for project development in the AEC (EIA Guidelines for Business Development in AEC).

April

- Offered free accident insurance policy privileges from Dhipaya Insurance Public Co., Ltd., to customers with PTT Blue Card members who refuel at PTT service stations under a 30-day coverage period.
- Signed a contract to commission detailed design of Wang Chan Valley development project with a joint-venture company between MAA Consultants Co., Ltd. (MAA), and Asian Engineering Consultants Co., Ltd. (AEC).

May

- Won approval from Energy Policy Administration Committee (EPAC) to adjust NGV retail prices, effective from May 16, 2018 to May 15, 2019, for public buses from THB 10.00 to THB 10.62 per kilogram, reflecting the increased heat value from 35,947 to 38,500 BTU per kilogram in accordance with the NGV gas quality management plan. This effort helped public vehicles save on gas, increase travelling distance.
- With MDX Public Co., Ltd., signed a memorandum of cooperation for a two-year conceptual study on natural gas services in Gateway Industrial Estate City. This was a model for the development of LNG services for the industrial sector by using truck or the LNG Satellite System (LNG - SAT) for the first time in Thailand. It helped increasing the potential and competitiveness of an industrial estate, including factories located in an industrial estate, through lower costs of fuels.
- Signed a memorandum of cooperation with ETRAN for technical support in the fabrication of electric motorcycle prototypes.
- Signed a memorandum of cooperation in promoting innovation capability with the National Innovation Agency (Public Organization) (NIA) to enhance innovation and extend PTT's research for commercializing.
- Signed a memorandum of cooperation on technology and innovation with nine banks, namely Bangkok Bank, Krung Thai Bank, Bank of Ayudhya, Kasikornthai Bank, Thai Military Bank, Siam Commercial Bank, Thanachart Bank, UOB Bank and Government Savings Bank to jointly promote and drive financial innovation development to improve financial systems.

June

- Delivered natural gas to SPP customer Amata B. Grimm Power (Rayong 4) Ltd. at 17 MMCF/D and delivering natural gas to industrial customer Sekisui Plastics Co., Ltd. (ESIE), at 0.11 MMCF/D.
- Collaborated with Kasikorn Bank, to develop PTT e-Wallet to boost convenience and enable quick payment for consumers in responding to the Thailand 4.0 National e-payment policy.
- Supported Thai farmers to open a garlic distribution shop at PTT service stations under the project "Join forces to help farmers" to increase distribution channels for agricultural products and accelerate the release of products directly to consumers without the middle man, resulting in better pricing for farmers. A total of 20 tons was sold through this effort.
- Signed a business transfer agreement to transfer assets and liabilities of the former Oil Business Unit as well as the shares of related companies to PTT Oil and Retail Business Plc. (PTTOR). PTT has started the process on July 1, 2018. Under the agreement, some assets related to PTT's Oil Business Unit have not been transferred, including the land transferred by the Fuels Organization, the rights and obligations of PTT for the sale of oil and petroleum products



Signed MOU of cooperation on technology and innovation with 9 banks

to government agencies of Thailand under the Procurement and Inventory Management Act of 2017, PTT LPG Terminal at Khao Bo Ya and Ban Rong Po), Sriracha Oil Terminal, and court cases related to oil business previously accepted by the court.

- Collaborated with the Office of the National Economic and Social Development Board (NESDB) in establishing Strategic Environmental Assessment (SEA) guidelines.
- Together with “Techsauce Team”, organized the Techsauce Global Conference, in which PTT participated in Energy Tech, publicizing it in the startup industry.
- Signed a memorandum of cooperation with Bangkok Industrial Gas Co., Ltd. (BIG), to conduct a feasibility study to apply industrial-gas technologies and patents to create business innovation.
- Signed a memorandum of cooperation with Thai Rung Union Car Plc. to jointly develop electric vehicles.
- Established areas in PTT service stations to become centers of communities and farmers to bring pineapples to sell without charge under a project to join forces to help farmers to alleviate Thai pineapple farmers’ concerns over low prices and accelerate direct pineapple delivery to consumers. The total volume sold through this channel was 600 tons.



Signed MOU of cooperation with Krungthep Thanakom Co., Ltd., to focus on business development, energy innovation and digital technology

July

- Started delivering natural gas to three industrial customers, namely Kasemsak Trading Co., Ltd., at 0.09 MMCF/D, Bangkok Industrial Gas Co., Ltd., at 0.03 MMCF/D and Asian Pacific Can Co., Ltd., at 0.1 MMCF/D.
- Secured approval from the Energy Regulatory Commission (ERC) to collect natural gas delivery service fees. The 2018 commodity charge (Tc) for the offshore pipeline system in Rayong (Area 1), gas pipeline system offshore Khanom (Area 2), and onshore gas pipeline (Area 3) is THB 1.1668 per million BTU. The Tc for the onshore gas pipeline system in Chana (Area 4) is THB 0.1569 per million BTU and the Tc of the onshore gas pipeline system in Nam Phong (Area 5) is THB 0.0000 per million BTU. All are the same service rates as those of previous year. These rates are effective from July 1, 2018, and continue until the new rates and rules come into effect. The service rates are based on the manual for the calculation of natural gas prices and the rates of service fees for natural gas delivery of December 2007, as well as Article 70 of the Energy Industry Act of 2007.

August

- Signed a memorandum of cooperation with TGI (Thai-German Institute) to establish standards as a key mechanism to drive the industrial transformation of the public sector in Thailand.
- Signed a memorandum of cooperation with Krungthep Thanakom Co., Ltd., to focus on business development, energy innovation and digital technology, creating additional value throughout the business chain and services by using digital and technology as a platform for providing services to develop Bangkok into “Bangkok Smart City”.
- Signed a partnership agreement with Mitsui (Mitsui & Co. Thailand), focusing on cooperation in various areas, including the Visualization Center and Linkage to International Robotics and Intelligent Solution Partners to support and serve Thailand Industry 4.0.



HRH Princess Maha Chakri Sirindhorn, on a private visit to EECi

- HRH Princess Maha Chakri Sirindhorn, on a private visit, graciously followed up on the progress of the Wang Chan Valley Development Project for the East Economic Corridor Innovation Zone (EECi) and visited the VISTEC Tower.
- Wang Chan Valley Development Project for EECi was declared under a new town plan as an innovation zone for EEC by the EEC Policy Committee to enable its construction.
- Signed a 96-rai land lease agreement with the National Science and Technology Development Agency (NSTDA) to support the construction of the NSTDA Research and Innovation Center Building (Phase 1).

September

- Supplied natural gas to SPP customer Gulf Power BL Co., Ltd., at 17 MMCF/D and industrial customer Ratchaburi Glass Industries Ltd., at 1.5 MMCF/D.

October

- Delivered natural gas to SPP customer Amata B. Grimm Power Rayong 5 at 17 MMCF/D and industrial customer BNP SS Steel Group Co., Ltd., at 0.71 MMCF/D.
- Signed an LNG contract with Bangkok Industrial Gas Co., Ltd. (BIG) for industrial customers outside gas pipeline routes. PTT will start delivering gas in 1Q2019 to replace LPG, fuel oil, and diesel.
- Signed a memorandum of cooperation with SAP to promote and develop “Driving Digital Economy to Enable Thailand 4.0”.

November

- Delivered delivering natural gas to SPP customer Gulf BP Power Plant at 17 MMCF/D and industrial customer Dairy Plus Company Ltd. at 1 MMCF/D.
- Signed an LNG contract with Tri-Gen Solutions Co., Ltd., for 10 years to promote the use of LNG among industries in areas outside gas pipeline routes of Thailand.
- Cooperated with PTT Digital Solutions Co., Ltd., to develop the Trading Relationship Excellence system (T-REX), an information system used to manage customers, business partners and various departments under the International Trading Business Unit, PTT subsidiaries, and representative offices located in various trading centers of the world to quickly connect information between each other, enabling analysis and responses to the needs of customers in a timely manner and continuously supporting the expansion of the business value of the business unit.
- Co-organized the “ETRAN KRAF” show, a prototype of electric motorcycles produced with the cooperation of PTT and ETRAN, a Thai start-up, at the Motor Expo 2018 in order to further enhance the innovation of electric motorcycles, which are more environmentally friendly.

December

- Delivered natural gas to industrial customer Nisshinbo Somboon Automotive Co., Ltd., at 0.11 MMCF/D and Tsuchiyoshi Somboon Coated Sand Company Limited (OGPS) at 0.15 MMCF/D.
- Signed a joint-venture agreement on the Air Separation Unit (ASU) Project with Bangkok Industrial Gas Co., Ltd. (BIG) which PTT Group and companies hold 51% and BIG holds 49% of the shares. The project uses the remaining cooling energy from LNG to separate and produce industrial gases such as nitrogen, oxygen, and argon to meet increasing demand for industrial usage and medical application. In addition, the nitrogen produced from the project, as enhanced innovation, can maintain the quality of fresh fruit prior to cold storage, making it possible to preserve better quality fruits, increase the value of agricultural products, raise the quality of life for farmers, and respond to government policies to establish the Eastern Fruit Corridor (EFC) as a high-quality central fruit market of high quality fruit in the EEC, and push Thailand to be a world fruit city. The project has a capacity of 450,000 TPA, and is expected to be commercially operational by 2021.
- Signed a memorandum of cooperation with the State Railway of Thailand (SRT) to focus on Smart City development and development of rail transport systems. This cooperation consists of a study and formulation of a plan to develop the area around the Phahonyothin Transport Center at Bang Sue Central Station with energy management and environmental consideration for sustainable development.



Signed a joint-venture agreement on the Air Separation Unit (ASU) Project with Bangkok Industrial Gas Co., Ltd. (BIG)



โครงการ Air Separation Unit: ASU

Extending Thai Energy Mission, Inspiration for Sustainability

Forging progress for communities, society, and the nation as a whole for the past **four decades**, PTT gave its all to the mission of accruing experience while maintaining balanced development work with unceasing care for society and the environment alike.



OUR Khung Bang Kachao Conservation:
Restore green areas as the lung of Bangkok and perimeter.

Sustainable energy based on unlimited potential



This national energy company is not going to rest on its laurels. Not only will we maintain our strides to vigorously drive the economy, society, and the environment, but we will also pass on the baton for creative energy to future generations to sustainably extend Thailand's bright future.



VISTEC:
Nurturing thinkers and doers and developing Thailand with science and technology, today VISTEC is a home to 180 master's and doctoral students in four schools.

Metro Forest Learning Center: Located on 12 rai is a source of knowledge for forest conservation and reforestation, welcoming an average of 24,000 visitors a year.

Wang Chan Forest Learning Center: A learning center for diverse reforestation, winner of an Award of Excellence (Wildlife, Biodiversity, Habitat Enhancement or Creation) from the International Federation of Landscape Architects (IFLA).

Stride a balance of development work through environmental stewardship

Supporting farmers: PTT supports coffee plantation growers who are tribespeople to earn income, become self-reliant, and command a better quality of life by promoting coffee planting and production under a sustainable natural resource conservation system.



Green

Stewardship of forest acreage: Collaborating with nationwide communities and networks, PTT has extended the project to honor HM the late King Bhumibol on his 50th accession to the throne by extending the reforestation plot from 1 million to 1,164,638 rai.

Strong communities



PTT is committed to drive Thai society toward social quality, promoting the well-being of communities to achieve Sustainable Development Goals (SDGs). With over 40 years of experience, PTT has become a high-performance organization in various areas with the ability to broaden the knowledge boundary to benefit the country and society as a whole. PTT has adopted the Sustainable Development Goals that the world community has established as a framework for operations. The operating strategies of PTT can be divided into two dimensions, namely

PEOPLE (Human Resource Development): raise the level of education to provide citizens with the skills needed in the 21st century, promote learning innovation, and improve the quality of life of the community and society. Apart from independent operations, the initiative is also carried out through “The Power of Learning Foundation” (PLEARN) that aims to create educational opportunities for young people who are gifted in mathematics and science and the “Power of Innovation Foundation” (PIN) that aims to support education, research and development of technologies that are essential to national development. This is undertaken in conjunction with alleviating social problems and helping the underprivileged through the “Power for Sustainable Future Foundation”.

PLANET (promoting the conservation and rehabilitation of natural resources and the environment), raising awareness and cooperation in environmental protection in collaboration with various sectors.

Development of human resources and creating strong society and communities



PEOPLE



Vidyasirimedhi Institute of Science and Technology and Kamnoetvidya Science Academy

“Developing youth and creating innovation for sustainability”

Science and technology in modern days are the primary factor driving national growth and development. PTT puts a strong emphasis on youth development and the new generation to keep up with new scientific knowledge through the high educational standards found at Kamnoetvidya Science Academy and Vidyasirimedhi Institute of Science and Technology. The two institutions are to originate leading thinkers and innovators based on future scientific technology and innovation for sustainability and national development.



Kamnoetvidya Science Academy: There were 71 graduating students in the first batch. About 90% of them continued their education to bachelor's degree programs in engineering, medicine, and science.

It additionally collaborated with the Ministry of Science and Technology in organizing Youth Greenovation Awards 2018, a competition for the royal cup bestowed by HRH Princess Maha Chakri Sirindhorn. This provides an opportunity for the youth in junior and senior high schools, vocational high schools or equivalent to express their creative ideas and innovations that are friendly to the environment and can be practically applied. The winning teams this year included:



Vidyasirimedhi Institute of Science and Technology (VISTEC): There were 13 master's degree students in the first batch that graduated in 2017 and received their degrees from HRH Princess Maha Chakri Sirindhorn on August 22nd, 2017. This was the ultimate pride for students and the institution. Currently there are 180 students, ranging from master's to doctoral programs, in four schools, namely the School of Molecular Science and Engineering, School of Energy Science and Engineering, School of Biomolecular Science and Engineering, and School of Information Science and Technology.

Junior high school

School name: Prachak Silapak School, Udon Thani

Project: Vacuum non-electricity

Senior high school

School name: Princess Chulabhorn Science High School, Pathum Thani

Project: Molding method development and study of human osteoblast cells and formation of bone substitute materials: hydroxyl apatite/gelatin/collagen hydrolysate that cross-linked with phenolic compounds from Thai neem.

Vocational high school

School name: Map Ta Phut Technical College

Project: The bricks from waste in the production process.



The institution has signed a "University-Industry Research Collaboration" agreement with PTT Group to enhance co-research and work development, adding further momentum to research outcomes for concrete application. One outstanding project is the research entitled "Technological development of energy storage on a lithium-ion battery" with a research fund from the Energy Policy and Planning Office (EPPO). This project creates an innovative lithium-ion battery with high performance, storing over 2,200 mAh/Cell, and can be used in small-sized vehicles such as Thailand's Tuk Tuks. This significantly contributed to the construction of a lithium-ion battery prototype plant on the compound of VISTEC for further commercial E-Tuk Tuks.



The 21st Century Schools

“Skills Development for Thai Youth, Marching to the Future”



PTT Public Company Limited has supported research projects such as Robotics, AI, and Intelligent Solution to advance the Exoskeleton system prototype of equipment support for patients with impaired limb areas, covering the hips down to the ankles, knees, thighs, and legs. This includes the prototype development of Smart Living equipment, powered by artificial intelligence. With the help of this intelligent robotic system, this project is expected to improve the quality of life for people, paralysis patients, and people with disability.

In addition, PTT has formed a collaborative network with leading organizations to support several key research projects; for example, Kasikorn Bank funded a research project entitled “Value creation for organic waste.” The results from this project have been productively utilized in Ban Maha Pho community, Amphoe Mueang, Nan.

Siam Commercial Bank has supported the establishment of an operational laboratory for cooperation between physicians and engineers, located at the Faculty of Medicine, Siriraj Hospital. This project develops artificial intelligence for practical uses under a research project called Neurocognitive Disorders and Neural Computing (NN Laboratory) to increase patients’ access to treatment.

PTT values education that aims to improve learners to be fully equipped with the required 21st century skills. It has signed a cooperative agreement called “Schools for the 21st Century by PTT” with the Primary Educational Service Area Office 1, Rayong, and Lam Plai Mat Withthaya School, Tambon Lam Phai Mat, Buri Ram. This five-year project (2016 - 2020) intends to develop a school or classroom prototype at Wat Noen Krapok School, Tambon Ban Chang, Rayong, and Wat Ta Kwoun School, Amphoe Mueang, Rayong.

Schools for the 21st Century initiated by PTT Group have an ultimate goal to “Nurture Teachers” emphasizing a new learning approach that goes along with global dynamism via Problem-Based Learning (PBL) and Professional Learning Community (PLC). This covers 1. learning management system; 2. activities to promote learners; 3. system/management leadership; 4. teacher development system using PLC; 5. the system to assist students; 6. the atmosphere and learning system; 7. the system to work with the family and communities; 8. an operating and sharing system with the network; and 9. information management system.

Clean energy, power to the community

“Build strong and self-reliant energy for communities”

The diversity of Thai terrain and ecology has given an advantage to the country to choose renewable energy as a clean source of energy without causing environmental impacts, such as wind power, solar power, and biogas. PTT has applied knowledge and expertise in engineering and energy to promote opportunities to access sustainable clean energy for communities by taking into consideration area appropriateness to solve problems, improve the quality of life, generate revenue, and reduce energy expenditure through communities' participation under the formulation of project design, training on management skills, and dissemination of knowledge so that the community can manage their own resources and systems by themselves. PTT has currently carried out various clean energy projects as follows:

GREEN ENERGY

Pracharath School Project

PTT Group supports the Sarn Palang Pracharath Project in basic education and human capital development (E5) by participating in the initiation and establishment of the Leadership Program for Sustainable Education or CONNEXT ED, in collaboration with 12 leading private companies in the country. The project is one of the key mechanisms for developing and building a new generation of network leaders that is involved in the development and upgrading of Thai education in a sustainable manner.

In addition, 24 employees in the PTT Group volunteers to develop the potential of teachers (School Partner) for 82 public schools throughout Thailand. Since 2017, the PTT Group, together with Kamnoetvidya Science School, has organized new curriculums in Science, Math, Technology (STEM: Science Technology Engineering and Mathematics) and English language for over 300 teachers to increase their knowledge and develop the management of teaching and learning processes for teachers to enable them to be able to continue to develop the potential of the youth of the country.



Hydraulic Ram Pump

This project aims to solve the problem of water shortages in high-land community areas. PTT joined hands with Khanon Kli Village, Tambon Tha Khanon, Kanchanaburi (along the Thailand-Myanmar western natural gas pipeline corridor), to explore the terrain in order to design and develop a hydraulic ram pump system. The system does not need fuel or electricity to work; instead it relies on energy from water flow whose speed is high but with a low pressure. It can bring water up to high altitudes. This project successfully solved water shortages for 17 communities, and the results could be extended to other areas nationwide. With the ability to access more than 54,600 per year cubic meters of clean water, it is not only benefiting households but also preventing forest fires.

PTT is determined to continuously develop the hydraulic ram pump and enhance its capacity to deliver water to high areas of up to 350 meters for distances as great as 2,300 meters. It plans to further investigate this project in other areas where water access remains problematic, along with further capacity development of the PTT Hydraulic Ram Pump and additional value creation.



Biogas System from Pig Farm Project

This project can mitigate smell disturbances and transform waste from pig farms to biogas to use within the community instead of LPG and wood-fired materials. This knowledge contributed to carbon credit trading with the help of the T-VER program to further generate income for communities. In 2018, PTT enhanced productivity in Tambon Tha Manao, Lop Buri; Tambon Kham Khaen, Khon Kaen; and Tambon San Sai, Chiang Mai. These projects benefited 610 households, generating more revenue, reducing expenditure for communities of around THB 3,745,786, and decreasing CO₂ emissions by to 5,013 tons of CO₂ equivalent per year.

Nature and Environment for Long Life

PLANET

PTT Reforestation Institute

PTT Reforestation Institute, in collaboration with communities and networks across the country, conducted the reforestation project to honor HM the late King Bhumibol on the occasion of his 50th anniversary of his accession to the throne, currently covering 1,164,638 Rai. In 2018, the company joined hands with the Faculty of Forestry, Kasetsart University, and summarized the research outcomes of this project, implemented from 1994 to 2016. It was found that the average carbon dioxide absorbed was around 2.18 million tons or an income equivalent of THB 280 million per year. In the future, this forest network for development will be expanded to generate more income for households and communities, paving the way toward community enterprises.

In addition, PTT puts a strong emphasis on the needs for reforestation and cultivation of knowledge for the public by encouraging them to learn from PTT's learning centers which include:





Wang Chan Forest Learning Center

Located in 351.35 Rai in Tambon Pa Yup Nai, Amphoe Wang Chan, Rayong, it is a learning center for diverse reforestation and conservation of local vegetation, water management, including biodiversity preservation. The center is also used for recreation by the public, with average visitors of 45,000 each year. In addition, it is a location for forest-planting pilot projects, which is in line with Thailand-Voluntary Emission and Reduction (T-VER), forestry category. In 2018, it was registered with the Greenhouse Gas Management Organization, with the ability to save 763 tons of carbon dioxide equivalent. It won an Award of Excellence (Wildlife, Biodiversity, Habitat Enhancement or Creation) from the International Federation of Landscape Architects (IFLA), based on the space planning concept and utility of land areas with the least adverse impact on nature.

Additionally, PTT has implemented a project named “Wang-Chan all love, sharing vegetables” in order to strengthen food security at the community level, improve the quality of life, and encourage villagers to plant vegetables for private consumption to reduce household expenditure. The products from this project are named “Wang Chan Vegetables”. HRH Princess Maha Chakri Sirindhorn graciously provided seeds while visiting the villagers to follow up on the progress of this project. It is considered a successful step of work that linked the communities and the center together through knowledge dissemination, experience, and participation. This has inspired the communities to take good care for the forest and ecology in a sustainable manner.



Metro Forest Learning Center

Located in 12 Rai on Sukhaphiban 2 Road, this is considered as a source of knowledge concerning forest conservation and reforestation. It is a place for recreation, in Bangkok, suitable for conservation workshops and environmental activities. This center attracts around 24,000 visitors per year.



Sirinath Rajini Mangrove Ecosystem Learning Center

Located at Tambon Paknam Pran, Amphoe Pran Buri, Prachuap Khiri Khan, the abandoned 387-Rai shrimp farm was successfully restored and transformed into a national and regional mangrove ecology learning center and the prototype shrimp farm restoration project under a fertile mangrove forest in collaboration with the communities and government agencies. In 2018, the center welcomed about 50,000 visitors, generating income for communities from tourism and commercial aquatic activities. Besides, PTT joined hands with the Natural Resources and Environmental Protection Volunteer Network (NEV-Net), consisting of the Ban Khlong Kao mangrove conservation group, Pak Nam Pran fishermen's group, and Sirinath Rajini Mangrove Ecosystem Learning Center, to integrate development work in these areas. It was then selected as an outstanding network for both provincial and regional levels, the third at the national level, by the Department of Environmental Quality Promotion, Ministry of Natural Resources and Environment.



The 100,000,000th Pradu Tree (Burma Padauk)

King's charisma, Burman Padauk expansion, peaceful citizens

Plantation block FPT 49, located at Amphoe Pak Thong Chai, Nakhon Ratchasima, is the largest reforestation project operated by PTT. This project was graced by HM King Maha Vajiralongkorn Bodindradebayavarangkun (HRH Crown Prince Maha Vajiralongkorn then) as a royal representative of HM the late King Bhumibol Adulyadej, who planted "The 100,000,000th Burma Padauk" under the reforestation project to honor HM King Bhumibol Adulyadej on July 14th, 1997. This forest became a symbol for the hearts and souls of Thais for reforestation in all areas, transforming over 26,000 Rai of degraded forest into fertile land, and was annexed as part of the Phu Luang Wildlife Reserve.

FPT 49 is situated in the midst of several global areas according to the conservation category of UNESCO, such as Sakaerat Biosphere Reserve, Dong Phya Yen - Khao Yai World Heritage Site, and Korat Geopark. With historical attractions, natural fertility of the forest, wildlife, and biological diversity, along with tourism potential, PTT in collaboration with all related sectors is determined to develop this forest area as a core linkage to the conservation of natural resources, using sustainable development modality to benefit the economy, society, and the environment.

Forest Protection by Citizen Volunteer Project

PTT in collaboration with the Department of National Parks, Wildlife and Plant Conservation implemented the forest protection by citizen volunteer project under the guidance of HM Queen Sirikit of the reign of King Rama 9. This project provided training to local people residing in PTT's reforestation plots. Since its establishment in 1997, there have been 169 batches, or 19,752 volunteers, who successfully passed the training, covering 135 sub-districts from 44 provinces nationwide. The project has welcomed active participation from all volunteers, which boosted understanding and generated a stronger network for restoration and conservation of abundant forests together with reforestation.



Vetiver Network

Initiated to prevent landslides, PTT joined forces with Chaipattana Foundation, Office of the Royal Development Projects Board (ORDPB), and Land Development Department to drive this collaborative network by taking a lead as a coordinator to promote knowledge management, develop the caliber of the network for self-reliance, and add momentum to the widened vetiver people network, which paved the way to self-management, exchange of knowledge on soil and water preservation, and development of vetiver products. There are currently around 10,000 vetiver members, generating income and reducing expenses from vetiver by more than THB 3.3 million per year.



Promoting natural resource and environmental conservation network

The primary factors to achieve the conservation of natural resources are active cooperation and efforts from the public sector, private agencies, and civil participation, as well as an inclusive vision to ensure that the overall procedures are carried out on a regular basis and responsive to the needs of projects and tasks. This enables community networks of natural resources to mutually achieve the goal of conservation more sustainably.



Green Globe Institute

This institute is operated under the authority of a panel with guidelines and directions for operation, including the development of knowledge and consideration of awards to honor those natural resource achievers. PTT is part of the main contributors to the operation of this project.

For over 20 years the institute has reserved more than 2.13 million Rai of forest covering community, people, and youth networks nationwide in six regions, resulting in the expansion of research and knowledge development. Details are as follows:

Development of Knowledge: PTT has conducted environmental research and studies of over 24 projects, as well as 19 local research studies. Significant outcomes can be further utilized and expanded, such as joint research on planting rubber, waste management, and the development of local courses on environmental studies. This includes research on the maintenance of culture and tradition, including Kui cultural studies, Khalam wood studies, forest fire investigations (a case study of the Khuan Khreng wetlands), along with the knowledge for disaster preparation, for instance, the use of radio communication in disasters, and others.

Network Development: This move is undertaken through the practical training required to safeguard adverse impacts from disasters, adaptation techniques on environmental effects for communities so that they can rely on themselves and optimize the use of national resources more sustainably, along with the restoration of ecosystems, forest, soil, and water.

One successful example is the training on “The Roles of Landscape, Natural Resources Management, and Land Utilization: The Natural Landscape (Case Study of Tambon Chumrak, Amphoe Mueang Trat, Trat Province) in collaboration with Trat Municipal City and Chumrak Natural Resources Conservation Group, Tambon Chumrak, Amphoe Mueang Trat, Trat. This training allowed communities to see the pros and cons in the areas which need to be improved, leading to landscape development for restoration and conservation, especially in the management of resources, lifestyles, and in-depth research investigation. This covers five work plans:

1. The construction of small dams (weirs) in the village's canals to slow the water flow, thus retaining water for agricultural activities.
2. Planting near the waterfront in order to maintain the soil surface from collapsing, creating more biodiversity, and serving as routes for living organisms.
3. Forest fire management for water resource control and fire prevention strips through the dissemination of knowledge to the villagers and minimize the impacts of forest fires, as in neighboring countries such as Cambodia.
4. The promotion of eco-tourism and historical attractions to boost the local tourism industry, such as the tour of seasonal fruit in orchards, development of the youth in local areas as guides to local historical places, and cruising on the river or canal to see abundant mangrove forest areas.
5. Research on aquatic plants by the youth, covering data collection for the development of a database for future area development.

OUR Khung Bang Kachao Project

Integration for sustainability

The project is the cooperation between the government, private sector, education sector, civil society and communities, including 34 organizations, 6 communities in the Khung Bang Kachao area, under the 5-year roadmap to create environmentally-friendly and 20 percent of sustainable economic and social growth (Green Growth) by using knowledge and expertise, including innovation and technology, from each organization to integrate solutions and develop with maximum efficiency. The program focuses on development in 6 aspects as follows:



- 1. The development of green areas** led by PTT Public Company Limited, with a focus on the restoration and maintenance of 6,000 rai of green space within 5 years. In 2018, the goal was set at 4,000 rai, in collaboration with the Green Area Conservation Network in all 6 districts of Khung Bang Kachao, which is located in the royal property area under the responsibility of the Royal Forest Department. This not only helps create a good environment, but is also an extension of tourism development, as well as generating income for the communities in the Khung Bang Kachao area.
- 2. Water management and river bank erosion management** led by the Utokapat Foundation under his Royal patronage aimed to balance between conservation and development of stability and sustainability of water resources, which leads to the stability of the green areas in Khung Bang Kachao. Through creating an example of a successful development program, the efforts will be expanded to cover all areas and will utilize the application of science and technology, together with local wisdom. A detailed database system will be developed and used to manage the area development and management of crisis, including destemming the water waterways, and sustainable canal and water restoration.
- 3. Waste management**, led by PTT Global Chemical Public Company Limited, aims to reduce waste according to the Circular Economy approach. By recycling waste to be processed and turned into a product for added value, beginning with the development of Jaak Dang Temple, the pilot area, into a learning center for the community regarding waste management.
- 4. Career promotion**, led by the Central Group Limited, aiming to promote the development of local product quality, emphasizing uniqueness or creating individual brands and brand recognition through the development of agricultural products to reach new GDP standards. The program aims to support the establishment of a central market to promote identity within the community, increase online marketing channels, including promoting organic agriculture tourism.

5. **Tourism**, led by the Designated Areas for Sustainable Tourism Administration, focuses on systematic community-based tourism management towards sustainable tourism development goals through the process of collaboration in a civil state to use tourism as a tool for improving the quality of life, well-being, and creating happiness for people in the community and its visitors.
6. **Youth development and education**, led by Thai Beverage Public Company Limited, focuses on systematically inheriting culture and traditions by the new generation through the creation of community learning resources that gathers historical data regarding community identity and history to cultivate the guidelines for the development of the OUR Khung Bang Kachao project in all aspects in order to preserve the identity of the Khung Bang Kachao community for the latter generations. This includes cultivating love and pride in the community, as well as preserving and restoring the traditional culture.

In this regard, the six operational frameworks will be integrated into the system in order to systematically develop the area. The development process that takes place under the OUR Khung Bang Kachao project will be able to contribute to improving the quality of life, which will result in the sustainable growth of the community and area according to the target. This can be a model for sustainable community development coexisting with green areas.



Waste Energy turned “Flower Gmmarden of Magic”

PTT focuses on creating value for waste energy by applying the cold energy that is a by-product from the process of transforming LNG from liquid into gas to be used to create coolness for a winter greenery planting house. The project also uses carbon dioxide from natural gas separation to accelerate plant growth. It is the integration of knowledge between government organizations, the private sector, and educational institutions, resulting in agricultural innovation, with the aim of creating economic prosperity for the country.

The Rayong Gas Separation Plant initiated the “Cooling and Carbon Dioxide Project in the research of winter greenery according to the Royal Initiative Project” to creatively create value from cooling energy and carbon dioxide. Therefore, the “Research Project on the Use of Cooling Energy” contributes to the creation of new knowledge to develop and extend innovation, creating opportunities and increasing productivity for industrial and agricultural sectors. This has resulted in various products such as flowers, various winter plant species, and Harumiki strawberries, a variety from Japan available now in Siam Paragon and Emporium department stores.

In addition, together with Rayong Province, the “Wonders of Winter Plant, Tulips in Bloom in Rayong” event has been organized at the Her Royal Highness Princess Maha Chakri Sirindhorn herb garden in Map Kha Subdistrict, Nikhom Phatthana District, Rayong Province, to show the potential of PTT Gas Separation Plant in using the waste resource to create knowledge, stability, wealth and sustainability for Thailand and the Thai people. This initiative can generate income for the community and the revenue has been donated to important places in Rayong as follows:

“Charoensukmongkoljit: Happy and Healthy Bike Lane”

The cycling lane received its title from King Rama IX and is located at Suvarnabhumi Airport, Bang Phli District, Samut Prakan Province, to encourage citizens to realize the importance of exercise and health care by cycling among nature and the wonderful open air environment.

The Happy and Healthy Bike Lane spans a total distance of 23.5 kilometers, consisting of a blue main bike lane for general riders, purple lane for experienced riders, and shorter tracks for children. PTT cooperates with network partners such as Airports of Thailand Public Company Limited and Siam Commercial Bank Public Company Limited to create a children’s bicycle track or GODJI LANE to cultivate and raise awareness of the importance of reducing the use of vehicles using fossil fuels, as well as encouraging the youth to love exercise. PTT also opened a Cafe Amazon for Chance, operated by the elderly. This is aimed to create career opportunities for the elderly to provide quality jobs, promoting self-value and self-esteem.

In addition, there are various facilities, including a parking lot, emergency medical center, bicycle shop, rental service, and restaurants to support the needs of cyclists and the general public.



2015

- 9,186,471 baht of generated income for the community from participating in trade fairs selling products
- 2,650,000 baht of revenue from tickets donated to Wang Chan Hospital, Rayong Province

2016

- 10,588,4452 baht of generated income for the community from participating in trade fairs selling products
- 4,621,981 baht of revenue from tickets donated to Baan Chang Hospital, Rayong Province

2018

- 11,424,168 baht of generated income for the community from participating in trade fairs selling products
- 3,091,738 baht of revenue from tickets donated to Public Health Service Center, Map Ta Phut Municipality,



“Sarn Palung” Social Enterprise moving forward and leaving no one behind

The establishment of Sarn Palung Social Enterprise Company Ltd. (SPSE) is to support the execution of social enterprises of PTT Group. SPSE aims at conducting businesses to solve social and environmental issues and promoting local employment in communities on the basis of efficiency and sustainability. In addition, such establishment supports public policy that encourages the private sector and state enterprises to participate in grooming and incubating social enterprises in Thailand. The following pieces describe the pilot projects under SPSE, implemented since 2018:



Café Amazon for Chance

career development for hearing-impaired people into “baristas”

This project intends to create opportunities for hearing-impaired persons as baristas via career development under the project of Café Amazon for Chance. They need are to pass the barista training courses offered by Amazon Inspiring Campus (AICA) under the management of Café Amazon Business Department, PTT Oil and Retail Business Public Company Limited (PTTOR), and are interned at Café Amazon for Chance at the Office of the President, Mahidol University, Salaya, Nakhon Pathom, before entering the actual work environment. Currently, there are 12 members under this project, and they can generate additional income per person of up to 50%, which is a promotion of employment opportunities for disabled persons so that they may have a permanent job, pride, and equality in society. Presently, Café Amazon for Chance has four operations:

1. Office of the President, Mahidol University, Salaya, Nakhon Pathom, since June 11, 2018.
2. Faculty of Environment and Resource Studies, Mahidol University, Salaya, Phuttamonthon, Nakhon Pathom, since August 4, 2018.
3. Arts Gallery at Ban Chao Phraya, Phra Athit Road, Phra Nakhon, Bangkok, since October 1, 2018.
4. Sky Lane Bicycle Track at Suvarnabhumi, Bang Phli, Samut Prakan, since December 1, 2018.



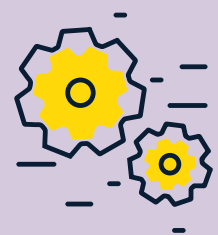
Community Coffee Sourcing Project

This project targets a group of coffee plantation growers to have sale channels with greater income and well-being, based on the system of a fair price, promotion, and support for farmers along with sustainable conservation of natural resources. This involves civil participation to develop themselves, society, and the environment in a community in order to grow hand in hand with one another. This project includes the purchase of coffee beans, designed to optimize coffee bean processing which in line with the Café Amazon standards together with the cost management for plantation, efficient processing of coffee, development of wastewater from coffee bean processing, and support to grow shady trees apart from coffee trees. In 2017, the project covered two communities: Pang Khon coffee-community enterprise and Akha coffee-community enterprise, Tambon Huai Chomphu, Amphoe Mueang, Chiang Rai. In 2018, it was expanded to cover eight communities: Ban Huai Yuak Pa So, Ban Huai Mak, Ban Sam Sung, and Ban Arto, Tambon Mae Salong, Amphoe Mae Fah Luang, Chiang Rai. This contains the Yot Doi Pang Khon coffee-community enterprise and Pang Khon coffee farm in Huai Chom Phu, Amphoe Mueang, Chiang Rai. This year, each member had a 10% increase in revenue. A part of income from this project will be contributed to the professional career development fund that aims to promote the quality of life for farmers and coffee growers in Thailand.



Innovation for a Sustainable Future

PTT is fully committed to relentlessly promoting and supporting the corporate value of innovation, creating an inspirational atmosphere of creativity and innovation for the entire organization and workforce. Employees are provided with opportunities through various channels to submit their creative and innovative ideas to compete in the annual PTT Innovation Award for rewards, inspirational recognition, and acceptance as role models. Public relations activities and media are continuously broadcasted to disseminate employee's innovative works and sharing knowledge with PTT's internal and external communities. The knowledge sharing is actively done through numerous channels, such as exhibitions of outstanding innovations at the PTT We Can Corner, publication of innovation articles in the monthly magazine "PTT Spirit", communication activities via PTT What's News, E-mail and posters. In 2018, PTT organized its annual PTT Group Innovation Awards to provide a forum for employees of all six flagship business units to share knowledge and direct experience on innovation development with all employees to follow their leads by taking current knowledge and skills to create more substantial value. The event also provides opportunity for all business units within PTT to jointly cooperate for development of new innovations.



INNOVATION

PTT Group Innovation Awards 2018



Under the disruptive technology trend, PTT has actively transformed to cope with changes by integration of D (Digitalization) into the SPIRIT, enhancing corporate value intensity and readiness to cope with digital transformation and drive PTT toward sustainability. PTT has founded a new organizational unit of Technology and Engineering on January 1, 2018, with a commitment to drive technology and digitalization, engineering and property development activities to support businesses of PTT on development of the New Business S-Curve for corporate domestic and international growth. A series of work activities of PTT have been transformed to meet the challenges of disruptive innovation, as follow.

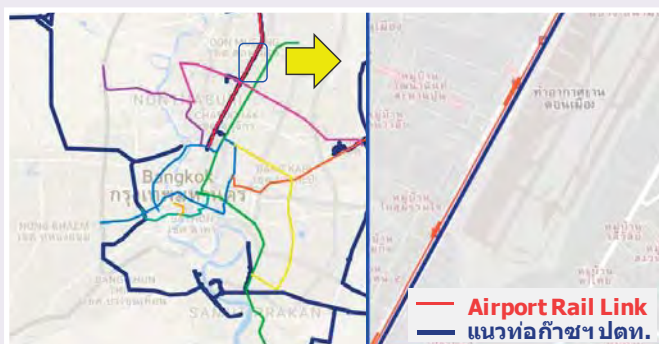
EV Charger

Joint development of a payment system via QR Code with Bank of Ayudhya Public Company Limited. The system, tested and installed at Energy Complex, is fully integrated with EV Charger.



Smart Energy Platform

Jointly developed with Sertis Company Limited, PTT's Expresso team successfully launched the Smart Energy Platform with Blockchain technology to support energy management of Energy Complex, pioneering a model of future Smart City development by PTT Group.



Smart i-Map

Development of the infrastructure and environment database system covering areas adjacent to PTT pipelines, provides digital data to enhance operational work activities of the PTT pipeline projects.



Outstanding innovation projects originated and developed by the creativity of PTT staff creating value for the organization and stakeholders and winning awards from external institutions, are as follows.

Operational Innovations:

The Soothsayer

The Soothsayer is a software innovation designed to help predicting operational losses and malfunctioning of equipment and machinery in the processes of the gas separation plants in Rayong 1-3 months in advance. The innovation was developed under the technologies of Big Data and Machine Learning, providing analysis to minimize unplanned shutdown of the gas separation plants and enough time for possible losses' preparation. The innovation helps save some THB 450 million for each financial and opportunity loss.



Outstanding State Enterprise Award 2018 from the State Enterprise Policy Office



Outstanding Innovation awards at State-Owned Enterprise Awards 2018



The Asset Corporate Award 2018 on Best Initiatives Category



The Soothsayer

Operational Innovations for Society

IoT for Pipeline Maintenance Work

To minimize risk from corroding of gas pipelines and risk from human errors on pipeline inspection, an innovation called IoT for Pipeline Maintenance Work was developed and applied for the inspection of more than 2,000 kilometers of pipelines operated by PTT nationwide. The new system focuses on the inspection efficiency of the cathodic protection system, a pipeline protective system for outer surface corrosion. Initiated jointly with AIS, the ingenious innovation provides maximum accuracy and most reliable handheld data transmitted via internet-based communication technology, replacing physical ground surveys by workers. In addition to reduction of risks borne by human error from ground surveys, the operation can reduce more than 8,000 man-hour physical activities, saving more than THB 12 million each year.

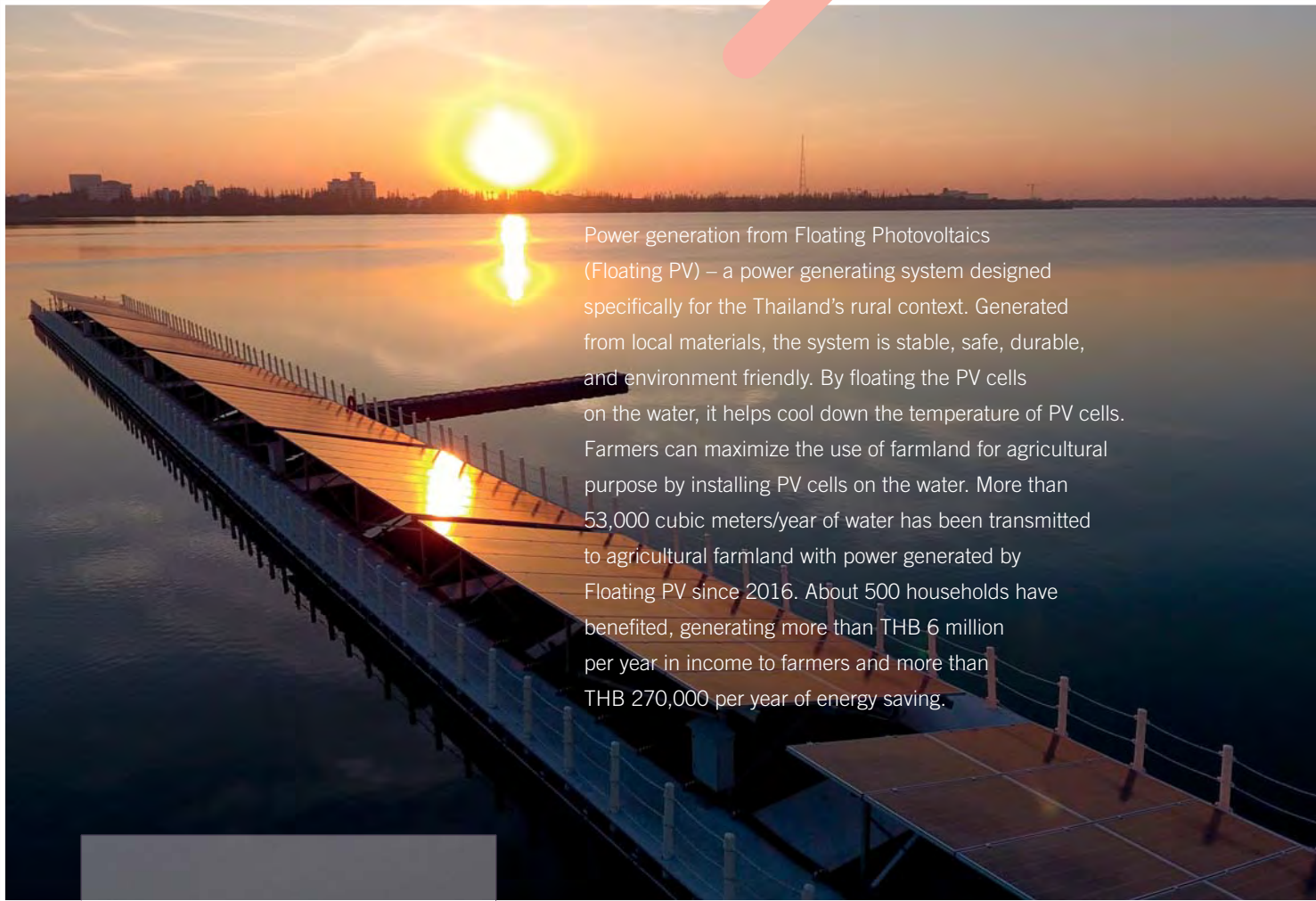


Second runner-up award, Economic Category, National Innovation Award 2018 from the National Innovation Agency.

CREATIVITY

Sustainable Energy Innovation for Community

Power generation from Floating Photovoltaics (Floating PV)



Power generation from Floating Photovoltaics (Floating PV) – a power generating system designed specifically for the Thailand's rural context. Generated from local materials, the system is stable, safe, durable, and environment friendly. By floating the PV cells on the water, it helps cool down the temperature of PV cells. Farmers can maximize the use of farmland for agricultural purpose by installing PV cells on the water. More than 53,000 cubic meters/year of water has been transmitted to agricultural farmland with power generated by Floating PV since 2016. About 500 households have benefited, generating more than THB 6 million per year in income to farmers and more than THB 270,000 per year of energy saving.



Outstanding State
Enterprise Award 2018 on
Social and Environmental
Innovation.

Agricultural areas installed with Floating Photovoltaics

SMART ENERGY



Social and Environmental Innovation

Soil slope integrity enhancement with vetiver in bamboo tubes



Vetiver grass implant in bamboo tubes.

Soil slope integrity enhancement with vetiver in bamboo tubes – the innovation was developed under the principle of soil bio-engineering and botanical integration. The engineering innovation enhances soil slope integrity by preventing of soil surface erosion and landslides along PTT pipeline routes in mountainous areas. Since Vetiver usually takes 3 - 6 months to root itself strongly with parental soil, bamboo tubes, with implanted vetiver, were piled into the earth along protective areas to enhancing the integrity of the soil slope while the vetiver implanted in bamboo holes becomes deeply rooted with the surrounding soil, enhancing the integrity of soil and leading to reduction of soil erosion. This technique has been subsequently adopted by other government agencies, such as the Department of Highways, for road construction.



PTT has long been striving to promote technology and innovation, making it internationally and domestically recognized as one of the world's most innovative companies. PTT's leadership in innovation is evidenced in countless state-of-the-art projects and top-notch awards. These achievements have contributed to making PTT not only a global leader in energy solutions but also the treasure and pride of the nation.





Financial Status and Performance

Performance of PTT and Subsidiaries

Unit: THB Million

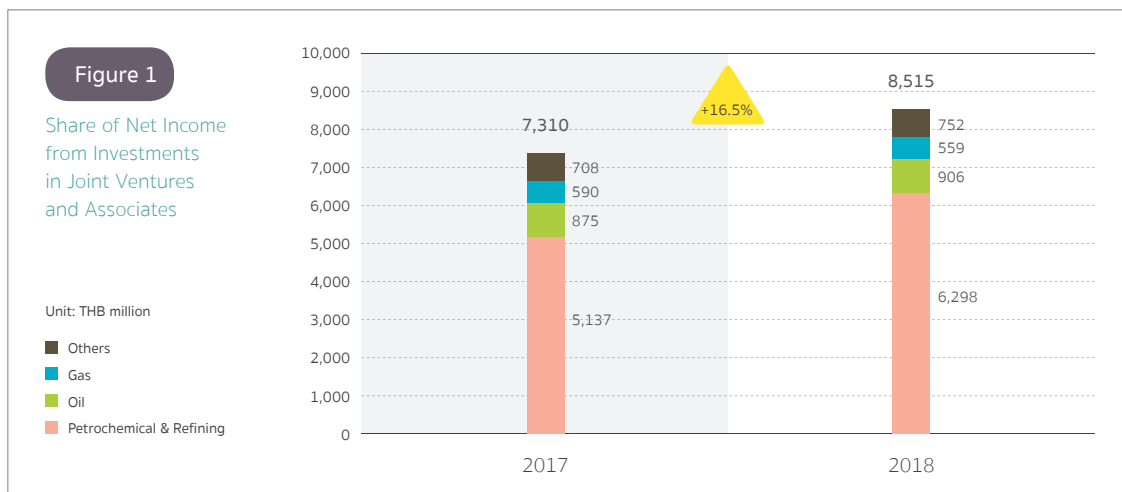
	Y2017	Y2018	% Increase/ (Decrease) (%)
Sales revenues	1,995,722	2,336,155	17.1%
Earnings before interests, income tax, depreciation and amortization (EBITDA)	345,395	351,396	1.7%
Operating Income	229,106	227,840	(0.6%)
Share of net income (loss) from investments in joint ventures and associates	7,310	8,515	16.5%
Gain (loss) on foreign exchange	13,650	6,354	(53.5%)
Income taxes	28,306	53,647	89.5%
Net income	135,180	119,684	(11.5%)

PTT and its subsidiaries recorded 2018 sales revenue of THB 2,336,155 million, 17.1% increased or by THB 340,433 million in all business groups compared with last year. It resulted from the increase in average product selling prices of most petroleum and petrochemical products following the rise of Dubai crude oil price. The average Dubai price increased 30.53% from USD 53.2 per barrel to USD 69.4 per barrel. PTT and its subsidiaries had EBITDA of THB 351,396 million in 2018, an increase of THB 6,001 million or 1.7% mainly from exploration and production business following higher average selling prices and sales volume. Moreover, better performance of gas business group in almost all business areas except NGV, especially GSP, Natural Gas Sales and Marketing (S&M) according to Small Power Producer (SPP) customers together with higher selling prices following crude oil price and Transmission Pipeline (TM) from power producer customers. Moreover, PTT's Gas affiliates also reported better performance, the PTTLNG from its revenue recognition of LNG Terminal 1 Phase 2 in 2018 and the PTTNGD also had higher average gas selling prices; whereas, overall performance of petrochemical and refining business decreased mainly from net stock loss in the accounting GIM following the sharp fall of crude oil prices in 4Q2018 versus stock gain in 2017. The olefins and aromatics petrochemical business performance was down from

the lower petrochemical spreads during the period around the net of 2018 over the concern of the slowdown in world economy from the impact of the unresolved United States and China trade war, products demand decreased on the back of fluctuations in raw material prices as well as inventories reduction during year end. Despite the increasing in production and sales volume, the higher utilization rate in 2018 versus 2017 led to the volume increase; GC's startup of LLDPE#2 in 2018 versus maintenance shutdown of both aromatics and olefins plants in 2017, IRPC's major turnaround in 2017. Likewise, performance of oil business with regard to stock loss in 2018 versus 2017 stock gain.

PTT and its subsidiaries recorded depreciation and amortization expenses of THB 123,495 million, an increase of THB 7,206 million or 6.2% from THB 116,289 million in 2017 according PTTEP's acquisition of participating interest in Bongkot gas field and IRPC project completion.

In 2018, share of net income from investments in joint ventures and associates was THB 8,515 million, increasing by THB 1,205 million or 16.5% from THB 7,310 million in 2017 mainly from the performance of PTTAC and NatureWorks LLC which are joint venture of GC following the rise in average product selling prices.



There was gain on foreign exchange, decreasing by THB THB 7,296 million from THB 13,650 million in 2017 to THB 6,354 million in 2018. This resulted mainly from the decrease in unrealized gain on foreign exchange rate from foreign currency loans of PTT, TOP and GC together with realized and unrealized gain on foreign exchange rate from account receivables of PTTEP due to an appreciation of THB against USD in 2018 lower than 2017.

In 2018, there was non-recurring item mainly are the loss on Montara field divestment of PTTEP amounting by THB 1,886 million, inventory loss by THB 2,004 million and gain on business acquisition of GC by THB 1,355 million. The non-recurring items in 2017 are PTTEP recognized impairment loss on assets of the Mariana Oil Sand Project amounting to THB 18,505 million, impairment loss on coal mining asset of PTTGM amounting to by THB 4,229 million and impairment loss on petrochemical business of PTTGC amounting by THB 2,296 million versus dividends income from investment in EPIF mutual fund of THB 4,310 million and gain on selling investment in SPRC and mutual fund of PTT

of THB 2,780 million. (These transactions have been recognized under PTT's stakeholding in net expense approximately THB 2,300 million in 2018 and THB 9,000 million in 2017.)

Finance cost decreased by THB 1,458 million or 5.0% from THB 29,086 million in 2017 to THB 27,628 million in 2018 mainly from lower average long-term loan compared with 2017 following repayment of long-term loans and redemption of debentures during 2018.

Corporate income taxes increased by THB 25,341 million or 89.5% from THB 28,306 million in 2017 to THB 53,647 million in 2018 mainly from PTT's income tax expenses related to restructuring of the oil business in 2018 amounting to THB 6,033 million and the full redemption of BOI tax privilege since 4Q2017 of GSP business unit, including PTTEP's tax expenses from an increase in petroleum profit from an increase in sales revenues.

Therefore, PTT and its subsidiaries reported net income of THB 119,684 million in 2018, a decrease of 11.5% or by THB 15,496 million from 2017 of THB 135,180 million.

Summary of non-recurring items in 2018 until present are as follows:

January 2018

- On January 23, 2018, GC has signed Engineering, Procurement and Construction Agreement for the new Olefins Reconfiguration Project (ORP) at Map Ta Phut Industrial Estate in Rayong Province with capacity of 750,000 TPA. The new olefins plant has been planned to commercially operate within 2020. The total investment of this project is approximately THB 36,000 million or about USD985 million.
- On January 29, 2018, the Board of Directors of PTTGC America LLC (PTTGCA), a subsidiary of PTTGC, approved the execution of Heads of Agreement (HOA) between PTTGCA and a subsidiary of Daelim Industrial Co., Ltd., construction and petrochemical company of Republic of Korea, to conduct a feasibility study of the Petrochemical Complex project in the State of Ohio, United States of America which will produce and distribute ethylene and its derivatives 1.5 MTPA.
- On January 31, 2018, PTTEP Mexico E&P Limited, S. de R.L. de C.V. (PTTEP MEP), a wholly-owned subsidiary of PTT Exploration and Production Public Company Limited (PTTEP), and its consortium have been selected as the successful bidders of 2 exploration blocks in the gulf of Mexico in Mexico.

February 2018	<ul style="list-style-type: none"> On February 6, 2018, the Ministry of Environment and Forestry of the Republic of Indonesia had filed a request to the court for withdrawal of a lawsuit, regarding to May 8, 2017 the legal action commenced in Indonesia relating to the Montara incident, with the reason to amend the claim. Therefore, the court had granted the request and ordered to strike the case out of the case-list. On February 20, 2018, the Board of Directors Meeting of PTT approved the acquisition of ordinary shares in IRPC Public Company Limited (IRPC) from the Government Savings Bank in the number of 1,950 million shares with a par value of THB 1 per share, equivalent to approximately 9.54% of the total issued and sold shares of IRPC, at the price of THB 7.10 per share, totaling THB 13,845 million, through the Stock Exchange of Thailand (Share Acquisition Transaction). As a result, PTT is currently holding 48.05% of IRPC's share capital. On February 20, 2018, the Board of Directors Meeting of PTT approved the establishment of PTT Treasury Center Company Limited (PTT TCC), a wholly owned subsidiary of PTT with a registered capital of THB 20 million in order to conduct the business in the area of International Headquarters (IHQ) and Treasury Center (TC) for the purpose of financial and treasury management of PTT Group.
March 2018	<ul style="list-style-type: none"> On March 21, 2018, GC Estate Company Limited, PTTTGC's wholly owned subsidiaries, signed Land's Sales and Purchase Agreement with PTT with the total value approximately THB 7,200 million. On March 30, 2018, the consortium consists of PTTEP HK Offshore Limited (Malaysian Branch) or PTTEP HKO (the Operator), a wholly-owned subsidiary of PTTEP, and PETRONAS Carigali Sdn. Bhd. (PCSB) with participating interests of 80% and 20% respectively, signed Production Sharing Contracts with Petroliaam Nasional Berhad (PETRONAS) for exploration and production rights of 2 blocks located in Malaysia.
April 2018	<ul style="list-style-type: none"> On April 12, 2018, the Annual General Meeting of Shareholders of PTT has passed the resolution as follows; <ul style="list-style-type: none"> The change in the par value of PTT from THB 10.00 per share to THB 1.00 per share and the amendment to clause 4 of PTT's Memorandum of Association to reflect such change in the par value. The new par value in Stock Exchange of Thailand was effective on April 24, 2018. Approved dividend payment for year 2017 at THB 20.00 per share, approximately THB 57,108 million or 42.8% of 2017 consolidated net income. On September 15, 2017, PTT paid an interim dividend for the operating results of the first half of 2017 at THB 8.00 per share. The remaining dividend for the second half of 2017 was at THB 12.00 per share which paid on April 27, 2018. On April 25, 2018, the Board of Directors Meeting of PTT passed a resolution to establish a new company to carry out the "Café Amazon" coffee business in Singapore. This is the stepping stone for Café Amazon to be as a global brand. The new company in Singapore has established in September 2018, with registered capital not more than SGD 6.5 million, consisting of ordinary share at 1 Singapore dollar per share, with shareholding 100% by PTT Oil and Retail Business Public Company Limited (PTTOR).

May 2018

- Sapthip Company Limited (SAPTHIP) (50% owned by Thailoil Ethanol Company Limited (TET) established Sapthip Green Energy Company Limited to conduct power plant business from biogas with an initial registered share capital of THB 1 million and 100% owned by SAPTHIP.
- Nava Nakorn Electricity Generating Company Limited (Subsidiary of GPSC will invest in an expansion for an addition of 60 megawatts of electricity generation capacity and 10 tons per hour of steam generation capacity, with the project cost of approximately THB 3,105 million. The commercial operation will commence in the third quarter of 2020. After the operation, Nava Nakorn Electricity Generating Company Limited will gain the total electricity generation capacity of approximately 185 megawatts and the net steam generation capacity of approximately 40 tons per hour.

June 2018

- On June 18, 2018, the Board of Directors Meeting of PTTGC has approved to establish Kuraray GC Advanced Materials Co., Ltd as a joint venture company. The purpose of the joint venture company is to invest in production of High-Heat Resistant Polyamide-9T (PA9T) 13,000 tons/year and Hydrogenated Styrenic Block Co-Polymer (HSBC) 16,000 tons/year. PTTGC will hold 33.4% share while Kuraray Co., Ltd (KRR) and Sumitomo Corporation (SC) will indirectly hold share Affiliate Companies by 53.3% and 13.3%, respectively. The initial register capital was THB 10 million.
- On June 21, 2018, PTTEP has completed the acquisition of the 22.22% stake in the Bongkot Project from Shell Integrated Gas Thailand Pte. Limited (Shell) and Thai Energy Company Limited (a wholly-owned subsidiary of Shell), with the transaction value before tax of approximately USD 750 million. As a result, PTTEP's stake in the Bongkot Project has effectively increased from 44.4445% to 66.6667% with incremental petroleum sales volume of approximately 35,000 barrels of oil equivalent per day.
- On June 29, 2018, the Board of Directors Meeting of Thai Oil Public Company Limited (TOP) has approved on the investment in the Clean Fuel Project (CFP) for enhancing the competitiveness of the company by improving its production efficiency, adding value to the products that is environmental friendly, and to increase its oil refining capacity from 275,000 to 400,000 barrel per day to allow the refineries to handle more types and greater quantities of crude oils, with the investment value of approximately USD 4,825 million or approximately THB 160,279 million. The construction time for this project is approximately 5 years.

July 2018

- On June 18, 2018, PTT and PTTOR had successfully executed the Business Transfer Agreement and PTT had commenced the process of transferring various assets and liabilities, and shares of related companies to PTTOR since July 1, 2018.
- On July 15, 2018, PTTEP Australasia (Ashmore Cartier) Pty Ltd, a subsidiary of PTTEP, signed a Sale and Purchase Agreement (SPA) to sell a 100% stake in the Montara field and its related assets in the Commonwealth of Australia, to Jadestone Energy (Eagle) Pty Ltd with the asset purchase price of USD 195 million with completion in September 2018.
- On July 23, 2018, the Board of Directors Meeting of PTTGC has approved to divest all of the remaining shares in Alliance Petrochemical Investment (Singapore) Pte. Ltd. which PTTGC owns 15.34% stake with the total value from the sale of shares equal to THB 663 million.

August 2018	<ul style="list-style-type: none"> On August 3, 2018, PTTOR CHINA has been registered to establish to carry out lubricants business in China with a registered capital of not more than THB 80 million (around USD 2.26 million), which PTTOR will hold 100% of PTTOR CHINA shares. On August 8, 2018, PTTGC together with an affiliated company signed SPA to acquired 74% shares of Siam Mitsui PTA Company Limited (SMPC), a Purified Terephthalic Acid (PTA) producer, and 74% shares of Thai PET Resin Company Limited (TPRC), a Polyethylene Terephthalate (PET) resin producer, from SCG Chemicals Co., Ltd. and Mitsui Chemicals, Inc. total investment around USD125 million or equivalent to approximately THB 4,148 million, which the transfer of shares had completed late 2018. The investment aimed to expand the downstream investment and increase market potential in polymer business.
October 2018	<ul style="list-style-type: none"> On September 28, 2018, the Board of Directors of PTT has approved a resolution for the payment of interim dividend for the first half of 2018 (1H/2018) performance to PTT's shareholders at the rate of THB 0.80 per share, totaling approximately THB 22,850 million, or 32.9% of the 1H/2018 consolidated net income. The payment of the dividend was on October 26, 2018. On October 16, 2018, the Board of Directors of IRPC had approved the Company to invest in Guangzhao Saiju Performance Polymer Ltd. (GZSJ) in China. The investment will be the subscription of capital increased shares equivalent to 15% of total registered capital, in an amount of RMB 135 million (approximately THB 650 million). Currently, GZSJ is the major operator of plastic product e-commerce business in China. The Board approved IRPC to incorporate the private company under the laws of Thailand with the registered capital amounting to THB 120 million, by which the Company and GZSJ will hold the shares equivalent to 55% and 45% of total shares, respectively, to develop the e-commerce platform focusing in plastic products in Thailand. On October 30, 2018, PTTGC has signed the Share Sale and Subscription Agreement to acquire 49% shares of Revolve Group Limited (RGL) from an original shareholder and by subscription of newly issues shares from RGL. The total investment was GBP 6.4 million or equivalent to approximately THB 281 million. RGL is a major producer of Rotomolding Compound with a significant market share in Europe and Oceania, which the major feedstock used is LLDPE plastic resin.
November 2018	<ul style="list-style-type: none"> On November 16, 2018, the Board of Directors of PTT approved an establishment of a new joint venture company between PTT, PTT's affiliate and Bangkok Industrial Gas Company Limited (BIG) under the name of Map Ta Phut Air Products Company Limited (MAP). PTT and PTT's affiliate aggregately will hold 51% in MAP shares, and BIG will hold 49% in MAP's shares. MAP will engage in the business of the production and distribution of industrial gas by applying technology of air separation processing utilizing waste cold energy from liquified natural gas (LNG) with the total investment approximately THB 1,500 million. The establishment was completed in early of 2019.

December 2018

- On December 7, 2018, GPSC has entered into share purchase agreement to acquire directly and indirectly, through subsidiaries company, in N.P.S. Stargroup Co., Ltd., World X Change Asia Co., Ltd., and P.P. Solar Co., Ltd., a solar power producer in Thailand and have the total power generation capacity of 39.5 megawatts, includes TerraForm Global Operating Co., Ltd., that provide operation and maintenance service for solar power plants. The total value of the transaction is approximately THB 3,070 million to be a solar power producer in Thailand.
- On December 13, 2018, PTTEP Energy Development Company Limited, a subsidiary of PTTEP, has been awarded the rights of petroleum exploration and production and as the operator for Exploration Block No. G1/61 (Erawan field) and G2/61 (Bongkot field) with holding interest of 60% and 100%, respectively. The Production Sharing Contracts (PSC) are expected to be signed within the first quarter of 2019.
- On December 21, 2018 Board of Directors Meeting of PTT has approved the five-year (Year 2019-2023) investment plan of PTT and wholly owned subsidiaries in an aggregate amount of THB 167,114 million. The major investments will be in gas business group and JV and wholly owned subsidiaries such as natural gas transmission pipeline system, expanding import capacity of LNG receiving terminal as well as expanding oil and non-oil business in Thailand and international. In addition, PTT has prepared provisional investment budget amounting to THB 187,616 million, mainly to expand its core business i.e. LNG Value Chain, and to invest in new s-curve businesses which in the process of undergoing feasibility studies.
- On December 26, 2018, the Office of the Energy Regulatory Commission (ERC) approved the proposed merger of GPSC and GLOW. The approval of the ERC was granted subject to a condition precedent that GLOW must sell Glow SPP 1 Co., Ltd. (SPP1) after GPSC has appealed the order disapproving such application on 12 November 2018 and that the sale of SPP1 should be completed by the first quarter of 2019.

January 2019

- On January 3, 2019, PTTEP has temporarily shutdown of the Bongkot's operation around 4 - 7 days due to the Tropical Storm "PABUK" entering the Gulf of Thailand. According to aforementioned situation, average sales volume during the period is estimated to reduce by 96,700 barrels of oil equivalent per day or accounted less than 1% of the average sales volume per day in 2019.
- PTTEP MENA Limited, a wholly-owned subsidiary of PTTEP, and Eni Abu Dhabi B.V., a wholly owned subsidiary of Eni, Italian multinational oil and gas company, have been selected as the successful bidders of two offshore blocks named Offshore 1 and 2 which are located in the north-west of Abu Dhabi, United Arab Emirates for exploration and production rights. The consortium has signed Concession Agreement with the Abu Dhabi National Oil Company (ADNOC) on January 12, 2019, with the participation interest for PTTEP MENA Limited at 30% and Eni Abu Dhabi B.V. (the Operator) at 70%.
- TOP has planned the maintenance schedule for 2019 to the shutdown schedule of Crude Distillation Unit 3 (CDU-3) and some major production units for major turnaround and tie-in new units of the CFP as planned since mid-June to mid-July 2019 for approximately 30 days. In the same period, Continuous Catalyst Regeneration Platformer Unit 1 (CCR-1) and Hydrocracking Unit 2 (HCU-2) will be shut down for approximately 30 days and 36 days respectively. For aromatics production units, Thai Paraxylene Company Limited (TPX) will be shut down since mid-June to end of July 2019 for approximately 45 days.
- In January 2019, TOP has entered agreements with GPSC's wholly-owned subsidiary to transfer ownership in the Energy Recovery Unit (ERU) with the designed generating capacity of 250 megawatts and steam, to supply the production process of the CFP Project, utilizing by-products of the CFP Project as the main source of fuel, instead of owned investment. The total value is not exceeding USD 757 million (approximately THB 24,113 million), expecting that the construction of the ERU Project will be completed in the third quarter of 2023. The transaction will be proposed to the 2019 Annual General Meeting of Shareholders of TOP and GPSC for consideration and approval.

Overall performance of PTT and its subsidiaries

Financial performance of Y2018 compared with Y2017 are summarized as follows:

Unit: THB Million

	2017	2018	% Inc. (Dec.)
Sales Revenue	1,995,722	2,336,155	17.1%
• Exploration & Production	147,725	171,809	16.3%
• Gas	443,740	489,549	10.3%
• Coal	19,575	20,527	4.9%
• Oil	547,296	601,064	9.8%
• International trading	935,616	1,239,121	32.4%
• Petrochemical & Refining	950,727	1,132,080	19.1%
• Others ^{1/}	26,134	32,244	23.4%
EBITDA	345,395	351,396	1.7%
• Exploration & Production	105,468	126,843	20.3%
• Gas	83,792	94,084	12.3%
• Coal	6,114	7,445	21.8%
• Oil	19,598	15,271	(22.1%)
• International trading			
• Excluding effect of FX and derivatives	527	2,702	> 100%
• Including effect of FX and derivatives	5,387	5,929	10.1%
• Petrochemical & Refining	123,835	97,821	(21.0%)
• Others	4,538	5,653	24.5%
Depreciation and Amortization Expenses	116,289	123,556	6.2%

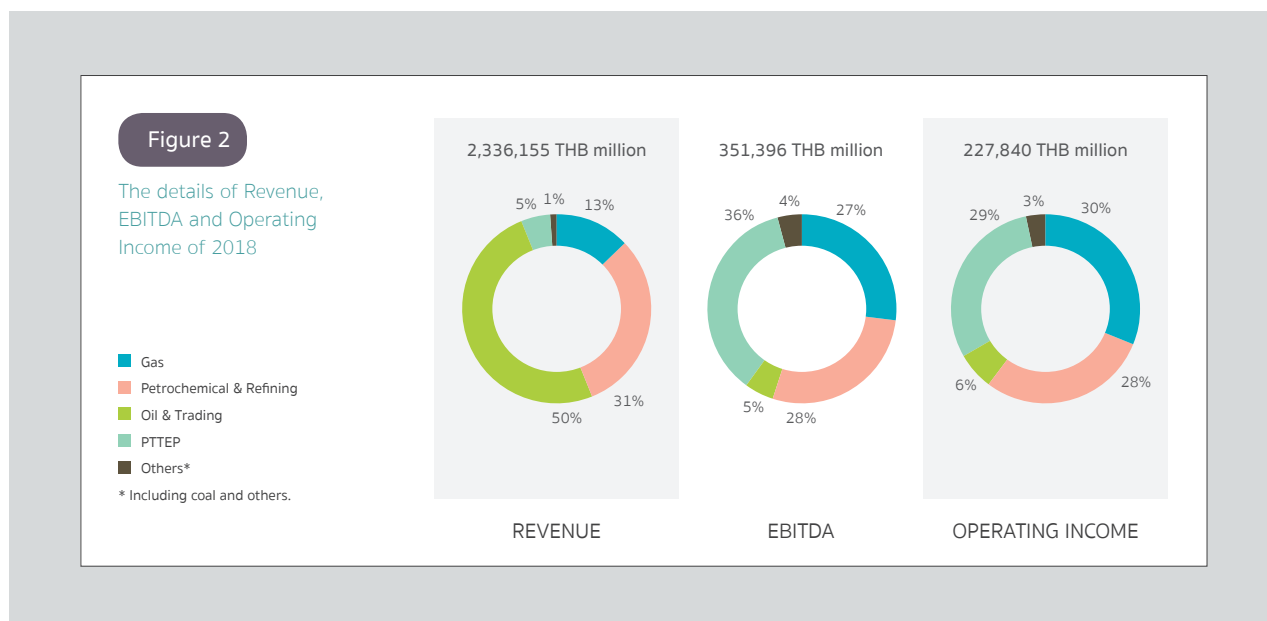
1/ Including Technology and Engineering Business

Unit: THB Million

	2017	2018	% INC. (DEC.)
Operating Income	229,106	227,840	(0.6%)
• Exploration & Production	49,699	66,701	34.2%
• Gas	67,451	76,088	12.8%
• Coal	4,224	5,516	30.6%
• Oil	15,454	10,955	(29.1%)
• International trading			
• Excluding effect of FX and derivatives	494	2,591	> 100%
• Including effect of FX and derivatives	5,354	5,818	8.7%
• Petrochemical & Refining	89,316	62,922	(29.6%)
• Others	946	1,489	57.4%
Share of net income from investments in joint ventures and associates	7,310	8,515	16.5%
Loss on impairment of assets	24,848	17	(99.9%)
Gain on foreign exchange	13,650	6,354	(53.5%)
EBIT	242,014	246,684	1.9%
Finance costs	29,086	27,628	(5.0%)
Income taxes	28,306	53,647	89.5%
Net income	135,180	119,684	(11.5%)
Earnings per share (THB/share)	4.67	4.15	(11.1%)

Segmentation performance of PTT and its subsidiaries

The details of revenue, EBITDA and operating income by segmentation of 2018 are as follows;



Upstream Petroleum and Gas Business Group

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

	2017	2018	% INC. (DEC.)
Average selling price (USD/BOE)	39.2	46.7	19.1%
Average sales volume (BOED)	299,206	305,522	2.1%

In 2018, PTTEP reported its sales revenue of THB 171,809 million in PTT and its subsidiaries' financial statements, increasing by THB 24,084 million or 16.3% from 2017. This resulted mainly from 19.1% increase in average selling prices from USD 39.2 per BOE in 2017 to USD 46.7 per BOE in 2018 and 2.1% increase in average sales volume from 299,206 BOED in 2017 to 305,522 BOED in 2018 according to an additional participating interests of 22.22% in Bongkot Project since June 2018 as well as the higher nomination from buyers of the "Contract 4" Project.

EBITDA in 2018 was recorded by THB 126,843 million, increasing by THB 21,375 million or 20.3%. The increase in EBITDA was mainly from the increase in gross profit by THB 24,376 million from the higher sales revenue despite the increase in petroleum royalties and remuneration by THB 2,733 million following the increase in domestic sales revenue. Whereas, there were higher depreciation and amortization expenses by THB 4,373 million from the additional participating interests of the Bongkot Project as well as an increase in development wells and wellhead platforms in the Contract 4 and S1 Projects. As a result, 2018 operating income was reported by THB 66,701 million, increasing by THB 17,002 million or 34.2%.

In 2018, overall performance increased following the increase in operating profit. Though there was an increase in income tax expense regarding the less appreciation of THB against USD in 2018, than in 2017, as well as the impairment loss on assets of the Mariana Oil Sand Project amounting to THB 18,505 million be recorded in 2017. Whereas, there were loss on the Montara field divestment of THB 1,886 million and the derecognition of deferred tax assets of PTTEP Australasia by THB 1,754 million in 2018.

Gas Business Group

The detail of all products sales volume from GSPs are as follows:

Unit: Ton

	2017	2018	% INC. (DEC.)
LPG	2,919,062	3,203,338	9.7%
Ethane	2,333,234	2,389,118	2.4%
Propane	826,526	907,028	9.7%
NGL ^{1/}	732,192	692,853	(5.4%)
Total	6,811,014	7,192,337	5.6%

Note:

1/ Include Pentane Product

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

Unit: USD per Ton

	2017	2018	% INC. (DEC.)
LPG ^{1/, 4/}	485	539	11.1%
Ethylene ^{2/}	1,092	1,149	5.2%
Propylene ^{2/}	823	990	20.3%
HDPE ^{2/}	1,168	1,335	14.3%
PP ^{2/}	1,155	1,273	10.2%
Naphtha ^{3/}	449	576	28.3%

Note:

1/ Contract Price (CP) 50:50

2/ South East Asia - Spot Price

3/ MOP Singapore (MOP'S)

4/ NEPC acknowledged the progress of LPG liberalization based on the approval of CEPA on December 2, 2016 for government LPG liberalization roadmap that consisted of 2 phases. Phase 1: Before complete the liberalization (Year 2017), liberalized only the LPG imports segment, while Refinery and Gas Separation Plant prices were still regulated through oil fund. Phase 2: LPG fully liberalization effective on August 1, 2017 with no selling price setting of LPG ex refinery and EPPO will only announce the reference price to regulate domestic LPG retail price. However, EPPO will have mechanism to monitor if LPG import price have material deviation from LPG ex GSP and will suggest CEPA to consider the case on a monthly basis.

In 2018, Gas business reported sales revenue of THB 489,549 million, increasing by THB 45,809 million or 10.3%. It is resulted mainly from the higher sales revenue of PTT's GSM and NGR business unit according to an increase in average selling prices following higher gas price despite a slight decrease in average natural gas sales volume (calculated at heating value of 1,000 BTU per cubic foot) from 4,716 MMSCFD in 2017 to 4,710 MMSCFD in 2018. The power producer customer volume in 2018 are closed to the 2017, while NGV volume decreased.

In addition, sales revenue of PTT's GSP business unit increased due to overall sales volume increased from 6,811,014 tons in 2017 to 7,192,337 tons in 2018 or 5.6%. (This resulted primarily from an increase in LPG product volume sold to PTTOR and an increase in Propane product volume according to PTTGC and HMC Polymer Company Limited (HMC)' maintenance shutdown in 2017, as well as the lower shutdown day of PTT's GSP in 2018; when compared to 2017 together with the higher average selling prices, according to the rise in the global referenced petrochemical prices.)

EBITDA and operating income of gas business group in 2018 was reported by THB 94,084 million and THB 76,088 million, increasing by THB 10,292 million and THB 8,637 million, respectively. Its better performance was mainly from PTT's GSP, GSM, NGR and TM as well as PTT's gas subsidiaries, the startup in PTT LNG revenue recognition of LNG terminal 1 Phase 2 with the capacity of 5 million ton per annum since March 2018 and the higher average selling prices of PTTNGD.

NGV reported loss increase from the higher natural gas cost, despite sales volume decreased. Though the selling prices of taxi and public cars increased from THB 10.00 per kg to THB 10.62 per kg since May 16, 2018. And the selling prices to private cars increased from the adjustment of improving gas quality expense, an increase by THB 0.4553 per kg from THB 3.4367 per kg to THB 3.8920 per kg, effective from September 16, 2017.

Coal Business

	2017	2018	% INC. (DEC.)
Newcastle index price (USD per ton)	88.5	107.3	21.2%
Average selling price (USD per ton)	70.3	77.6	10.4%
Sales volume (million tons)	8.3	8.2	(1.2%)

Sales revenue in 2018 was THB 20,527 million, increasing by THB 952 million or 4.9% mainly due to the average selling prices which increased by USD 7.3 per ton or 10.4% from USD 70.3 per ton in 2017 to USD 77.6 per ton in 2018 following the increase of Newcastle reference price by 21.2%. Meanwhile, sales volume in 2018 slightly decreased by 0.1 million ton or 1.2% from 8.3 million ton in 2017, to 8.2 million ton in 2018 due to lower demand in the second half of 2018 which resulted from the slowdown order from higher coal price.

EBITDA in 2018 was THB 7,445 million, increasing by THB 1,331 million or 21.8% mainly from the increase in gross profit by 1,184 million following higher selling prices, despite high cost and expenses from the past tax lawsuit by the Supreme Court Decision. Operating income in 2018 was THB 5,516 million, increasing by THB 1,292 million, compared with 2017 following higher EBITDA versus depreciation and amortization expenses increased by THB 39 million.

Downstream Petroleum Business Group

Oil Business Group

Unit: Million Liter

	2017	2018	% INC. (DEC.)
Average sales volume	26,006	26,351	1.3%

Sales revenue of oil business in 2018 was THB 601,064 million, increasing by THB 53,768 million or 9.8% mainly from higher product selling prices following rising global oil price especially from Jan-Sep 2018. Also, sales volume increased by 345 million liters or 1.3% from 26,006 million liters or equivalent to 448,159 barrels per day in 2017 to 26,351 million liters or equivalent to 454,103 barrels per day in 2018, mainly from diesel and gasoline due to stations' expansion and aviation fuel after International Civil Aviation Organization (ICAO) lifted Thailand off significant safety concern list since the beginning of 2018, allowing several airlines to resume their operations.

EBITDA and operating income in 2018 was at THB 15,271 million and THB 10,955 million, decreasing by THB 4,327 million and THB 4,499 million respectively, mainly from stock loss in 2018 instead of a stock gain in the previous year, as well as higher advertising, sales promotion, and operating expenses which increased following the stations' expansion, amid non-oil performance which improved 7% following an expansion of Café Amazon, and higher profit (that exclude stock loss) of diesel and gasoline.

International Trading Business Unit

Unit: Million Liter

	2017	2018	% INC. (DEC.)
Average sales volume	75,638	80,481	6.4%

In 2018, sales revenue of international trading business was THB 1,239,121 million, increasing by THB 303,505 million or 32.4% which resulted from the rise in product selling prices in accordance with global oil prices especially from Jan-Sep 2018. Moreover, the sales volume in this period increased by 4,843 million liters or 6.4% from 75,638 million liters or equivalent to 1,303,442 barrels per day in 2017 to 80,481 million liters or equivalent to 1,386,912 barrels per day in 2018, mainly due to higher sales volume of imported crude and condensate as IRPC refinery had major planned turnaround in 1Q2017, and higher sales volume of out-out Trading crude and condensate.

EBITDA, which adjusted the effect of foreign exchange rate and derivatives, in 2018 was THB 5,929 million, increasing by THB 542 million or 10.1%, mainly due to higher margin of imported crude and condensate together with higher margin of domestic condensate which resulted from the average oil prices in Crude Basket increased. Consequently, operating income which adjusted the effect of foreign exchange rate and derivatives of international trading business in 2018 increased to THB 5,818 million from THB 5,354 million in 2017, in line with the rise in EBITDA.

Petrochemical and Refinery Business Group

Unit: USD per barrel

	2017	2018	% INC. (DEC.)
Market GRM	5.74	4.69	(18.3%)
Inventory gain (loss)	1.04	(0.28)	< (100%)
Accounting GRM	6.40	4.36	(31.9%)
Refinery Utilization rate (%)	100.0%	104.4%	4.4%

Unit: USD per barrel

	2017	2018	% INC. (DEC.)
Olefins			
Naphtha (MOPJ)	496	614	23.8%
HDPE	1,168	1,330	13.9%
HDPE - Naphtha	672	716	6.5%
LLDPE	1,178	1,181	0.3%
LLDPE - Naphtha	682	567	(16.9%)
LDPE	1,277	1,207	(5.5%)
LDPE - Naphtha	781	593	(24.1%)
PP	1,155	1,269	9.9%
PP - Naphtha	659	655	(0.6%)
Aromatics			
Condensate	467	606	29.8%
BZ	823	821	(0.2%)
BZ - Cond	357	215	(39.8%)
PX	847	1,057	24.8%
PX - Cond	380	451	18.7%

In 2018, sales revenue of petrochemical and refining business was THB 1,132,080 million, increasing by THB 181,353 million or 19.1% mainly from the rise in average selling price of most petroleum and petrochemical products in both aromatics and olefins following the rise in crude oil prices and the increase in demand of downstream products.

Sales volume of refining business rose following the increasing of refinery utilization rates from 100.0% in 2017 to 104.4% in 2018 together with sales volume and operating rate of petrochemical business both olefins and aromatics increased due to GC's LLDPE II had started its commercial operation in 2018. Whereas in 2017, GC had efficiency improvement and planned maintenance shutdown of both olefins and aromatics plants, and IRPC had major planned turnaround.

In 2018, EBITDA of petrochemical and refining business was THB 97,821 million, dropping by THB 26,014 million, and operating income was THB 62,922 million, decreasing by THB 26,394 million, mainly from

- Overall refinery performance decreased following by the lower Accounting GRM from USD 6.40 per barrel in 2017 to USD 4.36 per barrel in 2018, as a result of decreasing in Market GRM from higher crude premium and lower gas line and fuel oil crack spread over crude oil. In addition, stock gain decreased from USD 1.04 per barrel to stock loss USD 0.28 per barrel following a significant drop in crude price.
- Overall olefins petrochemical performance decreased from lower product price especially in 4Q2018 and higher feed cost, despite the increased in sales volume mainly from PTTGC that had increasing capacities from LLDPE II. Aromatics petrochemical performance decreased due to lower BZ spread following higher supply especially in China from an unusually high inventory level. However, PX spread rose in 2018 due to improved demand from growing downstream business of Polyester and PTA for PET production to substitute diminishing recycled PET in China.

Other businesses

Other businesses include Technology and Engineering Business, which mainly come from GPSC.

Sales revenue of GPSC in 2018 was THB 24,880 million, increasing by THB 4,855 million or 24.2% from higher sales volume as IRPC-CP with the capacity of 240 megawatts started Commercial Operation Date (COD) of 2 phases and Ichinoseki Solar Power 1 GK (ISP1) with the capacity of 20.8 megawatts started COD since 4Q2017, as well as higher sales volume of Rayong Central Utility from higher demand of industrial users as they expanded production capacities. Additionally, the FT rate also increased slightly.

EBITDA in 2018 was THB 5,490 million, increasing by THB 1,076 million or 24.4% due to higher gross profit despite rising natural gas cost and higher selling and administrative expenses.

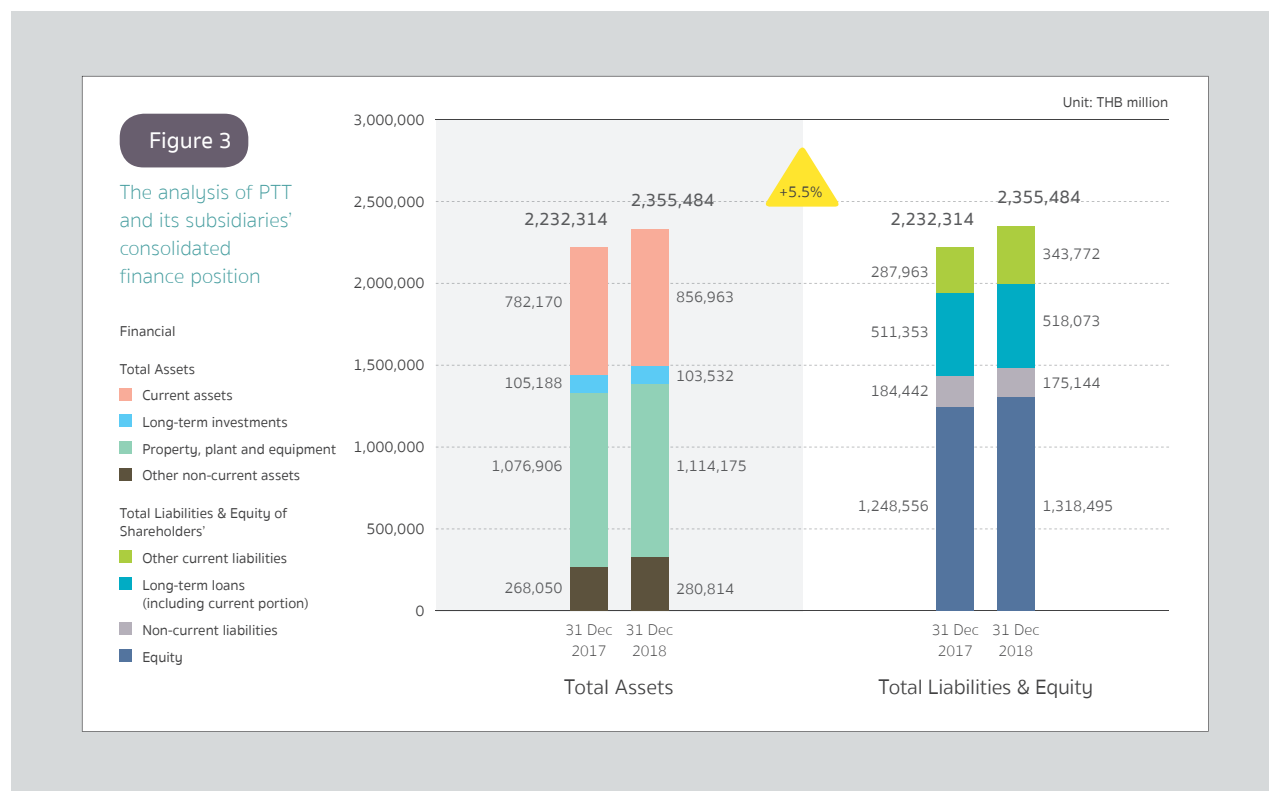
Overall performance of GPSC in 2018 improved, following higher EBITDA despite higher depreciation and amortization expenses from full phase operations of IRPC-CP and ISP1, as well as lower dividend income from RPCL when compared to 2017.

Net income in 2018 was THB 119,684 million, 11.5% drop or THB 15,496 million from 2017 net income of THB 135,180 million

In 2018, PTT and its subsidiaries had net income of THB 119,684 million, 11.5% drop or THB 15,496 million from 2017 net income of THB 135,180 million. This resulted from the performance increase of exploration and production business from the rise in both average selling prices and sales volume while there was a recognition of an impairment loss on assets of the Mariana Oil Sand Project amounting to THB 18,505 million in 2017. Moreover, performance of gas business group, both operating by PTT's and its affiliates also increased except NGV business. However, Petrochemical and Refining businesses' performance decreased mainly from stock loss following the sharp drop of crude oil prices in 4Q2018 while there was stock gain in 2017. The olefins and aromatics petrochemical business performance also decreased from the lower petrochemical spreads especially during the end of 2018 due to the concern on the slowdown in world economy and unresolved of United States and China trade war, despite the increasing in sales volume. Likewise, the performance of oil business decreased with regard to stock loss in 2018 versus stock gain in 2017. PTT and its subsidiaries recorded higher depreciation and amortization expenses according to PTTEP's acquisition of participating interest in Bongkot gas field and the increase in income tax expenses due to better performance of exploration and production business, higher income tax from the restructuring of oil business unit and lower BOI tax privilege. Moreover, there were loss on derivatives and the decrease in foreign exchange gain from lower appreciation of THB against USD in 2018 compared with 2017.

The Analysis of PTT and Its Subsidiaries' Consolidated Financial Position

As of December 31, 2018 Compared with December 31, 2017



Assets

As of December 31, 2018, total assets of PTT and its subsidiaries were THB 2,355,484 million, increasing by THB 123,170 million or 5.5% compared with December 31, 2017. The increase was mainly from the net effect of the followings:

- An increase of THB 74,793 million or 9.6% in current assets was mainly from the followings:
 - Net increase of THB 38,765 million in cash and cash equivalents and current investment mainly from the rise in operating cash flow from PTT and affiliates.
 - An increase of THB 3,408 million in inventory mainly due to the rise in inventory volume from both oil and gas products.
 - An increase of THB 32,931 million in other current assets mainly from other accounts receivable which from input vat refund from the payment for business acquisition of PTTOR and PTTEP's advance payment of the acquisition of additional stakes in the Bongkot Project.
- A decrease of THB 1,656 million or 1.6% of long-term investment mainly from the reclassification of available for sales of TOP and GC to current investment.
- An increase of THB 37,269 million or 3.5% in property, plant and equipment was mainly from the additional construction in progress assets of PTT Group, for instance, GC's projects; Olefins Reconfiguration, Propylene Oxide and Polyols, the 5th Transmission Pipeline Project of PTT, TOP's projects; Thaioil Sriracha Building project, New Crude Tanks Construction project, New Jetty 7 and 8, and Catalyst Cooler project of IRPC. Moreover, there were the acquisition of additional stakes 22.22% of the Bongkot Project as well as additional investment in exploration and production assets in Zawtika and S1 projects of PTTEP. However, depreciation, amortization and depletion in this period was THB 117,703 million.
- An increase of THB 12,764 million or 4.8% in other non-current assets was mainly from the increase in deferred tax asset (DTA) of PTTOR due to the transferring oil business unit from PTT. In addition, goodwill increased due to the acquisition of additional stakes of the Bongkot Project.

Liabilities

As of December 31, 2018, PTT and its subsidiaries had total liabilities of THB 1,036,989 million, increasing by THB 53,231 million or 5.4% from December 31, 2017, mainly from the followings:

- An increase of THB 55,809 million or 19.4% in other current liabilities primarily from higher other accounts payable which increased from PTTEP's deferred considerations acquired through business acquisition of additional stakes in the Bongkot Project and PTTGC's payable from additional construction of the Olefins Reconfiguration projects. Moreover, PTT's income tax payable increased in this period due to the transferring of Oil Business Group to PTTOR and the expiration of BOI privilege of GSP business unit in 2017.
- An increase of THB 6,720 million or 1.3% in long-term loans (including the current portion within 1 year) mainly from the higher of long term loan by THB 6,832 million included by the additional loans of THB 143,627 million in this period mainly from TOP, PTTOR, PTTGC, and IRPC. However, there were repayment of long-term loans and the redemption of debenture amounting to THB 136,795 million mainly from PTTGC, PTTEP, PTT, TOP and IRPC. Moreover, the effect of foreign exchange and fee resulted in higher long-term loans by THB 198 million.
- A decrease of THB 9,298 million or 5.0% in non-current liabilities mainly from advance receivable of PTTT decreased and deferred tax liabilities of PTTEP decreased following the appreciation of THB against USD.

Equity

As of December 31, 2018, PTT and its subsidiaries had total shareholders' equity of THB 1,318,495 million, increasing by THB 69,939 million or 5.6% from the year ended 2017, mainly due to performance in 2018 of PTT and its subsidiaries which was THB 119,684 million. Also, PTT had dividend payment from the performance of 2H/2017 by THB 12.00 per share and from the performance of 1H/2018 by THB 0.8 per share (After the change in par value of PTT's share from THB 10.00 per share to THB 1.00 per share) amounting to total THB 57,108 million.

Liquidity

For the year ended December 31, 2018, PTT and its subsidiaries had net increase in cash and cash equivalents amounting to THB 125,995 million, and cash and cash equivalents at the beginning of the period was THB 166,189 million. As a result, cash and cash equivalents at the end of the period was THB 292,184 million. Details of cash flow by activities are as follows:

	THB Million
Net cash provided by operating activities	267,801
Net cash used in investing activities	(34,148)
Net cash used in financing activities	(111,468)
Effects of exchange rates on cash and cash equivalents	637
Currency translation differences	3,173
Net decrease in cash and cash equivalents during the period	125,995
Cash and cash equivalents at the beginning of the period	166,189
Cash and cash equivalents at the end of the period	292,184

PTT and Its Affiliates

As of December 31, 2018

E&P Business Group Percentage

PTT Exploration and Production Public Co., Ltd.	PTTEP	65.29
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Gas Business Group Percentage

Trans Thai-Malaysia (Thailand) Co., Ltd.	TTM(T)	50.00
Trans Thai-Malaysia (Malaysia) Sdn. Bhd.	TTM(M)	50.00
PTT Natural Gas Distribution Co., Ltd.	PTTNGD	58.00
PTT LNG Co., Ltd.	PTTLNG	100.00
PTT Global LNG Co., Ltd.	PTTGL	50.00

Oil Business Group Percentage

PTT Oil and Retail Public Business Co., Ltd.	PTTOR	100.00
Petro Asia (Maoming) Co., Ltd.	PA (Maoming)	20.00
Petro Asia (Sanshui) Co., Ltd.	PA (Sanshui)	25.00

International Investment Business Group Percentage

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

International Trading Business Group Percentage

PTT International Trading Pte. Ltd.	PTTT	100.00
PTT International Trading London Limited	PTTT LDN	100.00

Petrochemical and Refining Business Group Percentage

PTT Global Chemical Public Co., Ltd.	GC	48.18
Thai Oil Public Co., Ltd.	TOP	48.03
IRPC Public Co., Ltd.	IRPC	48.05
PTT Tank Terminal Co., Ltd.	PTT TANK	100.00

Technology and Engineering Business Group Percentage

PTT Energy Solutions Co., Ltd.	PTTES	40.00
District Cooling System and Power Plant Co., Ltd.	DCAP	35.00
Thai Oil Power Co., Ltd.	TP	26.00
Global Power Synergy Public Co., Ltd.	GPSC	22.58
Energy Complex Co., Ltd.	EnCo	50.00
Baania (Thailand) Co., Ltd.	Baania	3.57
HG Robotics Co., Ltd.	HG Robotics	9.49

Other Business Group Percentage

Business Services Alliance Co., Ltd.	BSA	25.00
PTT Digital Solutions Co., Ltd.	PTT DIGITAL	20.00
Dhipaya Insurance Public Co., Ltd.	TIP	13.33
PTT Regional Treasury Center Pte. Ltd.	PTTRTC	100.00
Sarn Palung Social Enterprise Co., Ltd.	SPSE	20.00
PTT Treasury Center Co., Ltd.	PTT TCC	100.00

Note: PTT holds 100% of BSA's ordinary shares. Thus, PTT's ownership interest in BSA is 100%.

Revenue Structure of PTT and Subsidiaries* by Product Line

Product/Service	Operated by	% Share-holding	2016 (Audited)		2017 (Audited)		2018 (Audited)	
			THB million	%	THB million	%	THB million	%
1. Gas Products	PTT Plc.		367,696.92	21.17	356,916.23	17.45	360,419.76	15.22
	PTT Exploration and Production Plc. (PTTEP)	65.29	10,362.45	0.60	9,527.70	0.47	11,277.30	0.48
	PTT Natural Gas Distribution Co., Ltd. (PTTNGD)	58.00	7,343.61	0.42	9,815.40	0.48	12,238.71	0.52
	Global Power Synergy Plc. (GPSC)	22.58	78.42	0.01	62.24	-	62.56	-
	PTT Oil and Retail Business Plc. (PTTOR ¹⁾)	100.00	-	-	-	-	21,645.76	0.91
Total Revenue from Gas Products			385,481.40	22.20	376,321.57	18.40	405,644.09	17.13
2. Oil Products	PTT Plc.		550,266.24	31.68	604,353.66	29.55	489,636.41	20.68
	PTT Exploration and Production Plc. (PTTEP)	65.29	8,650.59	0.50	8,727.69	0.43	10,089.96	0.43
	PTT International Trading Pte. Ltd. (PTTT)	100.00	117,599.77	6.77	202,561.27	9.91	287,626.36	12.15
	PTT International Trading London Limited (PTTT LDN)	100.00	-	-	31,462.80	1.54	56,813.20	2.40
	PTT Global Chemical Plc. (PTTGC ³⁾)	48.18	20,315.68	1.17	25,501.09	1.25	32,993.95	1.39
	Thai Oil Plc. (TOP ³⁾)	48.03	112,309.11	6.46	149,568.69	7.31	167,123.39	7.06
	IRPC Plc. (IRPC ³⁾)	48.05	93,424.70	5.38	100,292.75	4.90	130,874.04	5.53
	PTT (Cambodia) Limited (PTTCL ²⁾)	-	7,036.15	0.40	9,104.02	0.45	-	-
	PTT Oil and Retail Business Plc. (PTTOR ¹⁾)	100.00	45,496.69	2.62	45,251.57	2.21	265,059.12	11.19
Total Revenue from Oil Products			955,098.93	54.98	1,176,823.54	57.55	1,440,216.43	60.83
3. Petrochemical Products	PTT Plc.		20,041.99	1.15	22,486.43	1.10	36,788.07	1.55
	PTT Global Chemical Plc. (PTTGC ³⁾)	48.18	110,974.12	6.39	218,118.80	10.67	232,641.11	9.82
	Thai Oil Plc. (TOP ³⁾)	48.03	23,639.62	1.36	26,835.75	1.31	30,368.45	1.28
	IRPC Plc. (IRPC ³⁾)	48.05	48,387.04	2.79	57,607.06	2.82	68,614.71	2.90
	PTT Polymer Marketing Co., Ltd. (PTTPM)	-	71,598.25	4.12	-	-	-	-
	PTT International Trading Pte., Ltd. (PTTT)	100.00	44,198.35	2.54	59,722.95	2.92	54,941.35	2.32
	PTT Oil and Retail Business Plc. (PTTOR ¹⁾)	100.00	-	-	-	-	391.05	0.02
Total Revenue from Petrochemical Products			318,839.37	18.35	384,770.99	18.82	423,744.74	17.89
4. Mining Products	PTT Energy Resources Co.,Ltd. (PTTER)	100.00	15,994.85	0.92	-	-	-	-
	PTT Global Management Co., Ltd. (PTTGM)	100.00	-	-	19,250.09	0.94	20,527.20	0.87
Total Revenue from Mining Products			15,994.85	0.92	19,250.09	0.94	20,527.20	0.87

Product/Service	Operated by	% Share-holding	2016 (Audited)		2017 (Audited)		2018 (Audited)	
			THB million	%	THB million	%	THB million	%
5. Utilities Products	PTT Plc.		-	-	1.32	-	0.75	-
	Thai Oil Plc. (TOP ^{3/})	48.03	3,316.62	0.19	4,557.83	0.22	4,834.71	0.20
	IRPC Plc. (IRPC ^{3/})	48.05	3,082.00	0.18	2,716.64	0.13	3,179.71	0.13
	Global Power Synergy Plc. (GPSC)	22.58	10,283.76	0.59	8,884.50	0.43	13,348.58	0.56
	Energy Complex Co., Ltd. (EnCo)	100.00	-	-	-	-	49.51	-
Total Revenue from Utilities Products			16,682.38	0.96	16,160.29	0.78	21,413.26	0.89
6. Non-oil Businesses	PTT Plc.		6,307.00	0.36	7,896.21	0.39	5,009.52	0.21
	PTT Oil and Retail Business Plc. (PTTOR ^{1/})	100.00	5,127.76	0.30	5,120.13	0.25	10,905.08	0.46
	PTT (Cambodia) Limited (PTTCL ^{2/})	-	338.92	0.02	623.20	0.03	-	-
Total Revenue from Non-oil Businesses			11,773.68	0.68	13,639.54	0.67	15,914.60	0.67
7. Revenue from Services	PTT Plc.		36.90	-	32.16	-	11.50	-
	PTT Exploration and Production Plc. (PTTEP)	65.29	2,345.22	0.14	2,626.92	0.13	3,481.65	0.15
	PTT Global Chemical Plc. (PTTGC ^{3/})	48.18	6,350.31	0.37	1,614.36	0.08	1,682.54	0.07
	Thai Oil Plc. (TOP ^{3/})	48.03	427.37	0.02	387.95	0.02	236.04	0.01
	IRPC Plc. (IRPC ^{3/})	48.05	591.68	0.03	543.36	0.03	574.57	0.02
	PTT Oil and Retail Business Plc. (PTTOR ^{1/})	100.00	493.11	0.03	464.30	0.02	492.05	0.02
	PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	20.00	50.33	-	84.31	-	189.47	0.01
	PTT Tank Terminal Co., Ltd. (PTT TANK)	100.00	756.29	0.04	727.46	0.04	643.85	0.03
	PTT Polymer Logistics Co., Ltd. (PTTPL)	-	126.93	0.01	-	-	-	-
	PTT Energy Solutions Co., Ltd. (PTTES)	40.00	46.29	-	14.94	-	28.68	-
	Energy Complex Co., Ltd. (EnCo)	50.00	291.17	0.02	282.13	0.01	261.68	0.01
	Business Services Alliance Co., Ltd. (BSA)	25.00	118.63	0.01	114.39	0.01	130.29	0.01
	PTT Oil Myanmar Co., Ltd. (PTTOM ^{2/})	-	8.87	-	6.28	-	-	-
Total Revenue from Services			11,643.10	0.67	6,898.56	0.34	7,732.32	0.33
8. Other Products	PTT Plc.		137.87	0.01	146.15	0.01	93.43	-
	Business Services Alliance Co., Ltd. (BSA)	25.00	4.71	-	5.58	-	4.90	-
	PTT Global Chemical Plc. (PTTGC ^{3/})	48.18	134.70	0.01	-	-	-	-
	Global Power Synergy Plc. (GPSC)	22.58	-	-	591.73	0.03	4.58	-
	PTT Digital Solutions Co., Ltd. (PTT DIGITAL)	20.00	11.30	-	-	-	-	-
	PTT International Trading Pte. Ltd. (PTTT)	100.00	2,937.85	0.17	988.45	0.05	744.39	0.03
	IRPC Plc. (IRPC ^{3/})	48.05	105.90	-	125.49	0.01	114.98	-
	PTT Oil Myanmar Co., Ltd. (PTTOM ^{2/})	-	-	-	0.09	-	-	-
Total Revenue from Other Products			3,332.33	0.19	1,857.49	0.10	962.28	0.03
Total Revenue from Products and Services			1,718,846.04	98.95	1,995,722.07	97.60	2,336,154.92	98.64
9. Others								
9.1 Other Revenue			9,682.65	0.56	28,268.51	1.38	16,935.10	0.72
9.2 Gain (loss) from foreign exchange			4,472.68	0.25	13,650.64	0.66	6,353.51	0.28
Total Other Revenue			14,155.33	0.81	41,919.15	2.04	23,288.61	1.00
10. Share of profit from investments in joint ventures and associates			4,143.21	0.24	7,310.42	0.36	8,515.02	0.36
Grand Total			1,737,144.58	100.00	2,044,951.64	100.00	2,367,958.55	100.00

Remarks:

* Revenues of PTT and subsidiaries are net revenues derived from external parties.

1/ Former: PTT Oil and Retail Business Co., Ltd. (PTTOR)

2/ Since July 1, 2018, PTT has commenced the process of transferring various assets and liabilities, and share of related companies which consisted of PTTCL and PTTOM to PTTOR.

3/ During 2018, PTT changed its shareholder portion in PTTGC, TOP and IRPC.



PTT's connected transactions resulted from the following agreements summarized below:

1. Transactions between PTT and state enterprises

Transactions

Sales of natural gas to state enterprises

PTT signed gas sales agreements (GSAs) with one state enterprise, namely the Electricity Generating of Thailand (EGAT), in which there are 3 GSAs currently:

1. GSA between PTT and EGAT, dated November 7, 1996.
2. GSA for Nam Phong Power Plant between PTT and EGAT, dated February 2, 2006.
3. GSA for Chana Power Plant between PTT and EGAT, dated November 2, 2007.

However, PTT and EGAT are now considering a new GSA to ensure alignment with the new national power development plan (PDP).

Sales of fuels and petroleum products to state enterprises

The Cabinet, on March 22, 2016, acknowledged the resolution of a committee on the consideration of privileges of state enterprises and agencies at Meeting No. 5/2558 (2015) on November 25, 2015, defining the privilege granted to PTT to sell to other government agencies and state enterprises besides EGAT 10,000 liters or more of fuels and petroleum products from a compulsory to a voluntary basis. In 2018, PTT sold fuels to the following state enterprises, where they still insisted on buying fuels from PTT: Bangkok Mass Transit Authority (BMTA), State Railway of Thailand (SRT), EGAT, and Transport Company Limited. Should a state enterprise owes PTT outstanding payments, PTT is entitled to levy interests under contractual conditions.

2. Transactions between PTT and subsidiary PTTEP Plc

Transactions

PTTEP and its subsidiaries produce and sell crude oil, natural gas, condensate, and LPG. In 2018, PTT was the major buyer (86% by volume) of these. As for natural gas, the two reached a long-term deal of 25-30 years, stipulating annual minimum contractual quantities. PTT entered into an agreement with PTTEP for the supply of crude oil and condensate, whereas PTT sold jet fuels and high-speed diesel to PTTEP under world market prices, identical to those sold to PTT by its partners or under competitive standard reference prices and sensible conditions.

Normal business transactions or those supporting normal business transactions

Item		Value as of December 31, 2018 (THB million)	Necessity and Sensibility
1.1	Sale of petroleum products	145,157.05	Pricing of petroleum products is tied to world market prices and identical to the prices of those sold to PTT by its project partners.
	LPG 74,292.26 metric ton		
	Crude oil 13.36 million barrel		
	Condensate 12.31 million barrel		
	Natural gas 432,892.14 MMscf		
1.2	Purchase of fuels	1,184.90	PTTEP's Board of Directors approved a five-year (2014-2018) fuel supply agreement with PTT. The prices under the agreement were based on competitive standard reference market prices and sensible terms.
	Jet fuel 0.84 million liters		
	High speed diesel 47.95 million liters		
	Natural gas 62.16 MMscf		

3. Transactions between PTT and petrochemical and refining affiliates

Transactions

PTT signed crude oil and raw material (feedstock) supply agreements and refined product purchase agreements with its petrochemical and refining affiliates as summarized below. PTT also signed GSAs for its feedstock for production process.

Agreements with Thai Oil Plc. (TOP)

- PTT has secured crude oil equivalent to 49.99% of TOP's refining capacity at market prices under a 10-year minimum contract starting in 2014. After the 10th year, either party may end the agreement through a written notice sent at least 12 months in advance under the Product Offtake and Crude Supply Agreement (POCSA) terms and conditions.
- PTT has secured natural gas for TOP's use in its refinery as required by an agreement between them at market prices, considered normal business practices, under a 10-year contract (January 1, 2014 - December 31, 2023).

Transactions and agreements with IRPC Plc. (IRPC)

- PTT has secured crude oil supply equivalent to 100% of IRPC's capacity at market prices for IRPC under a 3-year contract since 2018.
- PTT has signed a 10-year GSA with IRPC for gas firing power generation and cogeneration, effective from January 14, 2011 to January 13, 2021, and for IRPC's processes under a 5-year GSA (November 10, 2015 - October 31, 2020) at market prices.
- In addition, PTT also engaged in oil price hedging to ease the impacts of price volatility.

Transactions and agreements with PTT Global Chemical Plc. (GC)

GC was founded on October 19, 2011, through the amalgamation of PTT Chemical Plc. (PTTCH) and PTT Aromatics and Refining Plc. (PTTAR) under the Public Company Act B.E. 2535 (1992). The new company inherited all the assets, liabilities, rights, obligations, and responsibility of the two companies, and continues the operations of the two companies as summarized below.

Petrochemical business

- PTT secures major feedstock supply for GC's processes, namely ethane, propane, LPG, and NGL. Under these agreements, the price structure of ethane varies with that of film-grade HDPE in Southeast Asian markets – reflecting the entire petrochemical chain and the HDPE market. Similarly, the price structures of propane and LPG vary with that of film-grade PP in Southeast Asian markets. The prices of other feedstock are as agreed, that is, based on market prices.

The above agreements are extendable for five years, subject to the conditions of individual agreements.

- PTT supplies 4.6 - 6.1 million tons per year of condensate to GC under a long-term agreement under which the price is tied to a basket of crude oil prices.
- PTT entered into a long-term agreement under which it buys GC's outputs of aromatics and naphtha for sale to export customers, effective from 2001.

Refining business and petroleum product supply

- PTT has secured crude oil and other raw materials supply under a feedstock supply agreement, effective from February 1, 2009. Under the agreement, PTT is to secure crude oil grades and volumes at market prices, whether imported or from domestic sources.
- PTT has bought LPG at domestic market prices under an 18-year agreement, effective from February 9, 2006, beyond which the agreement is assumed to remain valid unless otherwise notified in advance.
- PTT signed a GSA with GC for the gas consumed in product refining and power generation, which is due to expire in 2029.
- In addition, PTT also engaged in oil price hedging to ease the impacts of price volatility.

4. Transactions between PTT and its affiliate of the Technology and Engineering Group

Transactions and agreements with Global Power Synergy Plc. (GPSC)

PTT signed a GSA for GPSC's power generation, which is considered a normal business practice. PTT is the country's sole seller of natural gas to industrial operators, with prices and conditions as agreed in the agreements. PTT supplies gas to GPSC's power plants as follows.

1) Sriracha Power Plant: PTT has signed a 25-year GSA with Sriracha Power Plant at an IPP gas price, effective until 2024. GPSC passes on fuel costs with the energy payment to EGAT. If PTT cannot deliver the volume of contractual gas and EGAT instructs GPSC to use its reserve fuel, EGAT will compensate GPSC for the excess gas. Sriracha Power Plant also signed a diesel supply agreement with TOP for use as reserve fuel. The 25-year agreement is due to expire in 2024.

2) Central Utility Plant 1 (CUP-1): PTT has secured 15-year GSA with CUP-1 for power generation. The 15-year GSA is due to expire in 2021.

3) Central Utility Plant 2 (CUP-2): PTT will supply gas to CUP-2 for power generation. The 15-year GSA is due to expire in 2022.

4) Central Utility Plant 3 (CUP-3): PTT has signed a long-term GSA with CUP-3 for its steam generation plant. The 15-year GSA agreement will end in 2023.

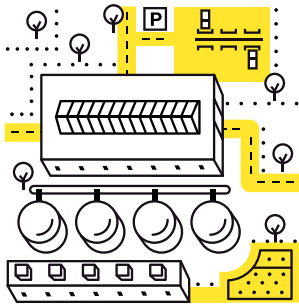
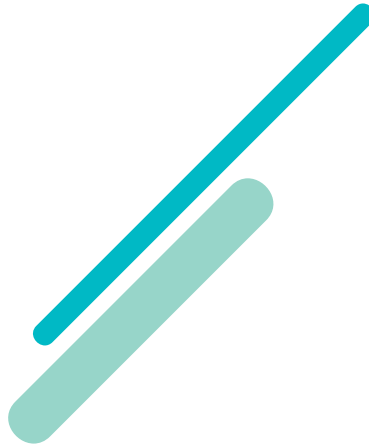
Sensibility of connected transactions

The purchase of goods, raw materials, or services (or all of them) from related companies is meant to create maximum mutual business benefit within PTT Group and to support national energy security. Such transactions are regarded as normal business practices. The volumes of goods or raw materials bought or sold by PTT or services provided or received by related parties match PTT's needs and businesses. To this end, such prices are as agreed in contracts, which leads to commercial benefit to both PTT and related parties without siphoning of benefits or irregular items.

Policy on 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, its subsidiaries, associated companies, related companies, or shareholders. Pricing will continue to be at arm's length, and the prices of products supplied by PTT's subsidiaries will be market-based. Disclosure of connected transactions will conform to SEC's and SET's rules and to the accounting standard for related parties/businesses disclosures announced by the Federation of Accounting Professions.

Business Assets



Net assets value after accumulated depreciation and allowance for impairment

THB **1,114,175** million

As of December 31, 2018, the core assets employed by PTT and its subsidiaries in their businesses commanded

Net intangible assets

THB **34,200** million

Net exploration and evaluation assets

THB **108,163** million

Details appear in the Notes to the Financial Statements for PTT and its subsidiaries for the year ended December 31, 2018: item 17 (property, plant & equipment), item 19 (intangible assets), and item 20 (exploration and evaluation assets).



Risk Factors

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 approach of COSO-ERM (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 designed an enterprise risk management policy for everyone to observe. The Enterprise Risk Management Committee (ERMC) and The Corporate Plan and Risk Management Committee (CPRC) were thus appointed to steer overall risk management for maximum efficiency.

Corporate risks must be systematically managed through the various management committees. Risk management must be integrated with the formulation of enterprise plans to give risk management plans effectiveness, efficiency, and alignment 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, which has been spelled out in the job descriptions for all units.

Investment in PTT stocks calls for investors' consideration of key risk factors arising from PTT's business conduct. Besides the risk factors available in this document, other risk factors do exist, either unknown to PTT at this time or currently seen by PTT as having negligible effects on its businesses. As for data on risks referenced to government or domestic economic data, they have been obtained from public information released by the government and other sources without PTT's verification. Investors should therefore exercise with caution.

Continuing and emerging risks that will prevail under changing circumstances fall into the following aspects.

1. Strategic Risks

1.1 Business strategy implementation

With upcoming innovation or technological progress resulting in disruptive technology that changes customers' needs and current business flows, PTT values the determination of PTT Group's business strategic directions to accommodate directions changing of the economy, society, energy, technology, and consumers' behavior that align with global megatrends. If PTT's strategies cannot promptly accommodate such change, it could suffer from impacts on businesses and performance outcomes.

A new strategy of establishing a New S-Curve has therefore been devised to pursue opportunities and develop new forms of businesses to handle upcoming changes. A new set of vision and future business strategies have been mapped out by a Top Executive Thinking Session (TTS) and a Strategic Thinking Session (STS) among PTT Group senior executives. The resulting business strategies are translated into five-year business plans, which are then integrated with risk management plans.

In addition, a meeting of PTT Group executives is held every month to monitor all affiliates' performance and share ideas to amend short-term business plans and strategies to ensure well-planned performance outcomes.

1.2 Diminishing natural gas outputs and continuity of gas production

After more than 30 years of production, reserves of natural gas from producing fields in Thailand and Myanmar have been depleted. Moreover, some of these gas fields have gradually entered the 'Post-Plateau' period, the period stipulated in the gas sales agreements in which producers are permitted to decrease the contract quantity amount of natural gas to be delivered. Under these circumstances, the chance of getting the same delivery volume as written in agreements is less and less. In addition, the gas sales agreements and petroleum concession agreements

for the Bongkot and Erawan gas fields combining delivery volume of 2.110 Billion Cubic Feet per Day (BCFD) will end in 2022-2023. The government has put up a bidding for areas covering both gas fields under a Production Sharing Contract (PSC) with terms of reference including the minimum combined delivery volume of 1.500 BCFD for the entire 10 years, significantly lower than the current delivery volume. PTT Exploration and Production Public Company Limited (PTTEP), as the operator of the group, won the bidding and E&P rights in both blocks. Even so, if the PSC signing between the government and PTTEP gets delayed or the transfer of petroleum blocks and operations from existing concessionaires to PTTEP deviates from the plan, there could be some impacts on the continuity of natural gas delivery from these two gas fields, which would certainly affect the overall PTT business performance.

To cope with the decreasing delivery volume of indigenous gas, PTT needs to procure additional long-term LNG. Under the preparation for additional use of LNG, construction of the second LNG Terminal, including receiving and delivery stations in Rayong, and laying of the 5th pipeline are underway. The procurement for natural gas from new sources in the Gulf of Thailand and the Malaysia-Thailand Joint Development Area (MTJDA) is also ongoing.

Besides the diminishing gas supply, one foresees rising costs of developing domestic gas fields, which could cause gas separation plants to lower their capacities to justify production costs. As a result, the volume of products, including LPG used as fuel and petrochemical feedstock, could fall short of domestic demand. This implies a need for more LPG imports and inevitable procurement and import of other suitable petrochemical feedstock. PTT has not only investigated the feasibility of using alternative feedstock and their imports, but also investigated the readiness of infrastructure by reviewing their economic viability and PTT Group's supply chain for optimal solutions.

1.3 Investment management efficiency

PTT does not only continuously grows its businesses, but also seeks new investments by itself and PTT Group. Doing so exposes PTT to risk of lower-than-targeted return on investment, project delays, and project cost overruns.

PTT, has therefore developed criteria for investment and investment budget management by PTT Group and applied PTT's affiliate governance approach to screen decisions, and monitor and steer PTT Group's investment. The process is known as SIM (Strategic Investment Management), in which the Investment Administration 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 to ensure PTT's most useful and efficient capital. In addition, PTT regularly monitors and analyzes the group's investment portfolios to improve performances and revise investment plans while valuing critical path management to lower project risks to the lowest levels so that projects can be completed in time, within budget, with suitable characteristics, and in compliance with laws and regulations.

1.4 Personnel development to accommodate business growth

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

To meet the challenges posed by dynamic technologies and work processes, PTT has developed a "workforce of the future", a program to equip employees with a new set of technological skills. This new workforce is provided with a new core competency set under new strategies and new directions with an ability to identify new business opportunities. Under this program, employees are entirely re-appraised and redeveloped with new potential in two major areas:

1. Employees are redeveloped on core competency through arrangement by the PTT Leadership and Learning Institute (PLLI). The redevelopment program provides them with a management view of business acumen, knowledge of technological and digital trends, and a basic concept of innovation development, to be able to apply and push for changes in their respective work processes and cope with all changes.
2. Employees are redeveloped on functional competency through arrangement by the Functional Academy. The redevelopment program provides training and in-depth knowledge of each business with real practices.

In addition, to accommodate the execution of strategic directions for each business unit, PTT has laid down a structure supporting work and stated the number of personnel required to meet the needs of each business unit for each given period. 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 personnel of each career path along with leadership development and promotion of learning. These moves ensure that PTT will constantly command an adequate supply of quality executives and employees.

1.5 Reputation risks

Diverse expectations of stakeholders, and with today's technological advancements, do accelerate communication, thus may cause negative news toward PTT go viral very quickly. Some of the information may damage PTT's image and the public's confidence in PTT.

To mitigate these impacts, PTT defined a mission for balanced stewardship of stakeholders and aspires to become an organization of pride focusing on transparent business and balanced stewardship of stakeholders and to yield suitable returns to its shareholders. We refer to "PTT's Pride and Treasure of Thailand". The 2018 stakeholder engagement survey revealed a stably balance of relationship among stakeholders and PTT with no significant anomaly or difference, a satisfactory result giving the leading position to PTT in the industry. The survey also provided data on expectations by stakeholders. This is crucially important to the development and improvement of the 2019 stakeholder engagement program. Responsible staff routinely monitor social movements and gather online news and issues concerning the businesses of PTT and respond accordingly in a timely manner.

PTT, in addition, has translated these valuable data to develop a stakeholder management plan fully integrated with other plans to become a corporate strategic master plan. Stakeholder management is developed with a focus on the preventive approach, governed and monitored by the Enterprise Risk Management Committee (ERMC), which is tasked to review the corporate-level stakeholder management plan and review on a quarterly basis. The top executives of each business unit level are tasked to manage and review stakeholder management at the business unit level and report to relevant senior management. In addition, PTT commands tools for managing and handling complaints. To elaborate, the unit which handles each complaint is to coordinate with the responsible unit in resolving the complaint and track corrective actions, including reporting the summary of causes, impacts, recommendations, and updates on complaint resolution to respective superiors. Finally, it is to provide periodic feedback to complainants until the closure of the complaint.

PTT Groups core value (SPIRIT + Digitalization) was created for all executives and employees to work together to become good and great persons, responsible for the corporation and external society. PTT Group sets future business directions to strike a balance and establish common value supplementation among business, society, and the environment under the Social Enterprise (SE) concept. PTT's focuses on the anti-corruption policy, engaging in transparent business under corporate governance.

2. Operational Risks

2.1 Price volatility of petroleum and petrochemicals

PTT Group's raw material 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 PTT Group's future performance and returns on investment.

To make price risk management higher efficiency, PTT defined a risk mitigation plan to 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 optimizing risk management of feedstock and product prices, as well as those of crude oil and refined products, within the group. Presently, to manage price risks, the group engages in hedging through short-term and long-term derivative contracts with business partners. To this end, meticulous, prudent data analyses are conducted, while suitable risk management tools are chosen to fit periods and objectives, including the swap or option tools.

Also in place is a structure and process for supervising risk management with checks and balances on a par with international standards. 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.

2.2 Compliance with applicable policies, laws, and regulations

There are many laws and regulations with complexities that can affect the business performance of PTT as well as its corporate image and reputation. Some of these are laws on trade competition and the Government Procurement and Supplies Management Act B.E. 2560 (2017), new and amended government policies, laws, and regulations of concern are budgeting laws, state audit laws, laws concerning state financial discipline, and laws on anti-corruption.

To fully comply with relevant laws, PTT is committed to its Compliance Policy, a policy to govern all activities to comply with state laws and regulations of PTT Public Company Limited, and the Compliance Framework, an operating guideline to ensure full compliance with state laws and

regulations of PTT Public Company Limited. The policy and framework are strictly observed by all directors, executives and employees. A responsible unit of PTT closely monitors development of new laws with proactive participation, including provision details of operations and various obstacles, and occasionally seeking clarifications on certain legislation. These involvements ensure that all activities performed by PTT fully comply with existing and new laws. In addition to the state laws, PTT continuously promotes the culture of PTT Way and PTT Way of Conduct to all staff throughout PTT Group to have all activities performed in the same conduct, same standard and same direction, ranging from the definition and implementation of policies to the development of performance indicators, compliance, and business conduct under the framework. To ensure good governance and good internal control with zero risks of non-compliance with policies, state laws, and related regulations, PTT has developed a Governance Risk and Compliance (GRC) system through research and process designs to integrate all activities in the system. Under the system, a GRC framework has been developed to define targets and respective strategies for all units to jointly participate. All units are responsible for continuously improving their roles and responsibilities and report the results to the Corporate Governance Committee, which is tasked to oversee integrated risk assessment and monitor the work efficiency of all performance to ensure full compliance with all applicable policies, state laws, and regulations. Activities on communication, development of personnel and technology and data network are fully supported to increase GRC efficiency. A pilot area was created to test the system on risk assessment, risk management plans and monitoring and its reporting to applicable committees.

2.3 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, natural catastrophes, threats of political instability, together with terrorist activities and other unexpected hazards. All could prove detrimental to PTT and could wreak damage on PTT's major infrastructure. To lower the impacts of such threats, PTT activates the PTT Group Business Continuity Management System Standard (BCMS) and PTT Group Security, Safety, Health and Environmental Management

Standard (PTT Group SSHE MS) for business units, support units, and PTT Group to leverage in developing and linking up with both common systems. PTT does not only safeguards value-adding activities at sites but also in every step of work to prevent disruptions, ranging from movement of feedstock and petroleum products by applying the five principles of safety management in PTT Group's automotive transport to prevent value-adding activities under PTT's business chain from being disrupted. In addition, PTT reviewed, amended, and developed BCMS to ensure practical connection between business units and stage integrated corporate BCM drills under the "Black Swan" scenario to ensure BCMS recertification of ISO 22301.

Following best practices in the petroleum and petrochemical industries, PTT has subscribed to insurance policies to protect its core operating assets from business interruption in case of additional insurance coverage for operation suspension. But such subscription may not be all-inclusive, since no insurance company offers such comprehensive insurance. Alternatively, it sometimes could prove uneconomic to buy high-coverage insurance. While PTT believes that PTT Group companies have insurance policies that are up to industrial standards, PTT cannot control the ceiling amounts of PTT Group's insurance policies to cover possible damage. In other words, properties that are not 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, or business opportunities could face severe repercussions.

3. Financial Risks

3.1 Volatility of the Thai baht (THB)

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

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

To ease risks of the Baht fluctuation, PTT has balanced 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 and product exports. PTT has also developed a finance policy as an effective, uniform guideline for PTT Group, which includes terms of reference for assorted risk management practices, which could affect PTT's financial position.

3.2 Financial support to affiliated companies

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

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

In extending such financial support to these affiliates via subordinated loans, commercial credit, or loans from the shareholders, PTT cannot guarantee that these companies can 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 affect 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 company if such action is considered more beneficial. If any of this should happen, the Thai accounting 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 puts PTT's overall financial position at stake.

3.3 Financing of funds for plan execution

The businesses of PTT—in particular, petroleum exploration and production, natural gas transmission systems, gas separation plants, and the petrochemical businesses—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 business conduct that focuses on fostering long-term growth and corporate governance, PTT plans to invest in prudent business expansion with due regard for sources of capital, particularly capital structuring that enables it to maintain crucial financial ratios at suitable levels 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.



Securities and Shareholders

PTT's Securities

Common shares

As of December 31, 2018, 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. (The 2018 Annual General Meeting of Shareholders (AGM) held on April 12, 2018, passed a resolution approving the change in the par value of PTT's shares from THB 10 per share to THB 1 per share and the amendment to Clause 4 of PTT's Memorandum of Association to reflect such change in the par value, with effect from April 24, 2018).

Bonds and debentures

As of December 31, 2018, PTT's had THB 1,000 million of domestic loans in PTT bonds with the Ministry of Finance guarantee and THB 109,715 million of PTT debentures with no government guarantee, for a total of THB 110,715 million. Foreign loans were in PTT debentures of US dollar denominations not guaranteed by the ministry, equivalent to THB 27,969 million. A summary appears below.

Bonds and Debentures	Amount (THB Million)	Redemption Date	Guarantee
PTT bonds guaranteed by the Ministry of Finance			
• Domestic bonds	1,000	2020	None
PTT debentures not guaranteed by the Ministry of Finance			
• Domestic debentures ^{1/ 4/}	109,715	2020 - 2110	None
• Foreign debentures ^{2/ 3/ 4/}	27,969	2035 - 2042	None
Total	137,684		
Grand Total	138,684		

Note:

1/ Fitch Rating's national rating of long-term PTT debentures at 'AAA (tha)' with a stable outlook

2/ Moody's international rating of foreign PTT debentures at 'Baa1' with a stable outlook

3/ S&P's international rating of foreign PTT debentures at 'BBB+' with a stable outlook

4/ See details of domestic and foreign PTT debentures

Unsecured, unsubordinated domestic debentures

Symbol	Amount (THB Million)	Annual Coupon Rate (%) (Payment Frequency)	Maturity Period (Years)/ Redemption Schedule
PTTC195A	1,000	5.90 (every six months)	Fifteen/ 2019
PTTC195B	15,000	(Year 1 - 4) 4.10 (Year 5 - 6) 5.10 (every six months)	6 years, 11 months and 24 days/ 2019
PTTC195C	10,000	(Year 1 - 4) 4.10 (Year 5 - 6) 5.10 (every six months)	6 years, 9 months and 15 days/ 2019
PTTC20NA	22,000	4.75 (every six months)	6 years, 11 months and 19 days/ 2020
PTTC208A	4,118	5.95 (every six months)	Fifteen/ 2020
PTTC215A	1,030	6.53 (every six months)	Fifteen/ 2021
PTTC21NA	10,000 ^{1/}	4.00 (every six months)	6 years, 11 months/ 2021
PTTC21NB	4,200	3.50 (every six months)	6 years, and 27 days/ 2021
PTTC222A	4,000 ^{2/}	4.50 (every six months)	Twelve/ 2022

Symbol	Amount (THB Million)	Annual Coupon Rate (%) (Payment Frequency)	Maturity Period (Years)/ Redemption Schedule
PTTC239A	10,000	6.58 (once at the end of redemption period)	Ten/ 2023
PTTC243A	14,967 ^{3/}	(Year 1 - 5) 5.00 (Year 6-8) 6.20 (Year 9 - 15) 6.80 (every six months)	Fifteen/ 2024 (redeemable after Year 8)
PTTC247A	9,400 ^{4/}	(Year 1 - 5) 4.25 (Year 6 - 10) 5.50 (Year 11 - 15) 5.75 (every six months)	Fifteen/ 2024 (redeemable after Year 10)
PTTC10DA	4,000 ^{5/}	5.90 (every six months)	100 years/ 2110 (redeemable after Year 50 and Year 75, and as defined in the terms on rights and duties of the issuers and the holders)
Total	109,715		

Unsecured, unsubordinated foreign debentures

Symbol	Amount (THB Million)	Annual Coupon Rate (%)	Maturity (Years)/ Redemption Schedule
USD Bond 2005	9,540	5.875 (every six months)	Thirty/ 2035
USD Bond 2012	18,429 ^{6/}	4.50 (every six months)	Thirty/ 2042
Total	27,969		

Note:

- 1/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 6 billion at a fixed rate to THBFIX + a fixed rate per year on the Baht-denominated principal. The swap will end on November 15, 2021.
- 2/ 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 interest rate per year on the dollar-denominated principal.
- 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 THBFIX + a fixed rate per year on the Baht-denominated principal. The swap will end on August 15, 2024.
- 5/ PTT engaged in an interest rate swap from Baht-denominated debentures worth THB 4 billion at a fixed rate to THBFIX + a fixed rate per year on the Baht-denominated principal. The swap will end on December 2, 2027, for THB 2 billion and on June 2, 2028, for the other THB 2 billion.
- 6/ PTT engaged in an interest rate swap from dollar-denominated debentures worth USD500 million at LIBOR + a fixed interest rate per year on the dollar-denominated principal.

PTT warrants

PTT has issued and offered 60,000,000 warrants to the President, the 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 have been exercised, and no new ones have been issued.

Short-term bill of exchange

As of December 31, 2018, no short-term bill of exchange was outstanding.

Shareholders

Below was PTT's shareholding structure as of October 12, 2018, the Record date for the 2018 interim dividend payment.

Item	Shares (in million)	Value (THB million)	%
Registered Capital	28,562.9	28,562.9	-
Paid-up Capital (as of October 12, 2018)	28,562.9	28,562.9	100.000
• 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	-	-	-

PTT's top 12 shareholders (as of October 12, 2018):

No.	Name	Shares	%
1.	Ministry of Finance	14,598,855,750	51.111
2.	Thai NVDR Co., Ltd.	2,196,575,586	7.690
3.	Vayupak Fund 1 by MFC Asset Management Plc	1,736,895,500	6.081
4.	Vayupak Fund 1 by Krung Thai Asset Management Plc	1,736,895,500	6.081
5.	STATE STREET EUROPE LIMITED	572,054,528	2.003
6.	SOUTH EAST ASIA UK (TYPE C) NOMINEES LIMITED	547,412,451	1.917
7.	Social Security Office	391,204,100	1.370
8.	THE BANK OF NEW YORK (NOMINEES) LIMITED	263,758,093	0.923

No.	Name	Shares	%
9.	GIC PRIVATE LIMITED	235,759,200	0.825
10.	N.C.B. TRUST LIMITED-NORGES BANK 1	182,479,900	0.639
11.	BNY MELLON NOMINEES LIMITED	156,147,932	0.547
12.	SOUTH EAST ASIA UK (TYPE A) NOMINEES LIMITED	147,761,976	0.517
	Total	22,765,800,516	79.704

Note:

- Numbers 6, 8, 11 and 12 were nominee accounts. 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 dictated PTT's management policy. The ministry nominated directors to the Board for approval by the shareholders. Other substantial shareholders, including Numbers 6, 8, 11 and 12, exercised no influence over PTT's management policy formulation, including director nomination.
- Shareholders of Thai NVDR Co., Ltd., who held non-voting depository receipts (NVDR) in Item 2, were ineligible for voting at shareholders' meetings except when exercising their voting rights on delisting the shares from SET.

Dividend policy

PTT

PTT has a policy is to pay out dividend no less than 25% of its net income after deducting all provisional reserves required by law and company regulations. While the net income is based on the consolidated financial statements, dividend payment is subject to future investment plans, necessities and suitabilities. Once the Board has decided on annual dividend payment, it seeks approval from the shareholders' meeting. An exception is for interim dividend payment, which can be approved by the Board and reported to the next shareholders' meeting.

Subsidiaries

Concerning subsidiaries' dividend policies, each subsidiary may decide dividend payment by taking into account its remaining cash flow in comparison with the investment capital. In case the cash flow is substantial enough after legal provisions, the subsidiary may proceed with the payment.

PTTEP

Barring other necessity, the Board has to propose the dividend payments to the shareholders meeting at no less than 30% of PTTEP's net income after deducting its annual income tax each year, with occasional interim dividend payment. As for the Dividend payment policies of its subsidiaries, there is no policies have been adopted.

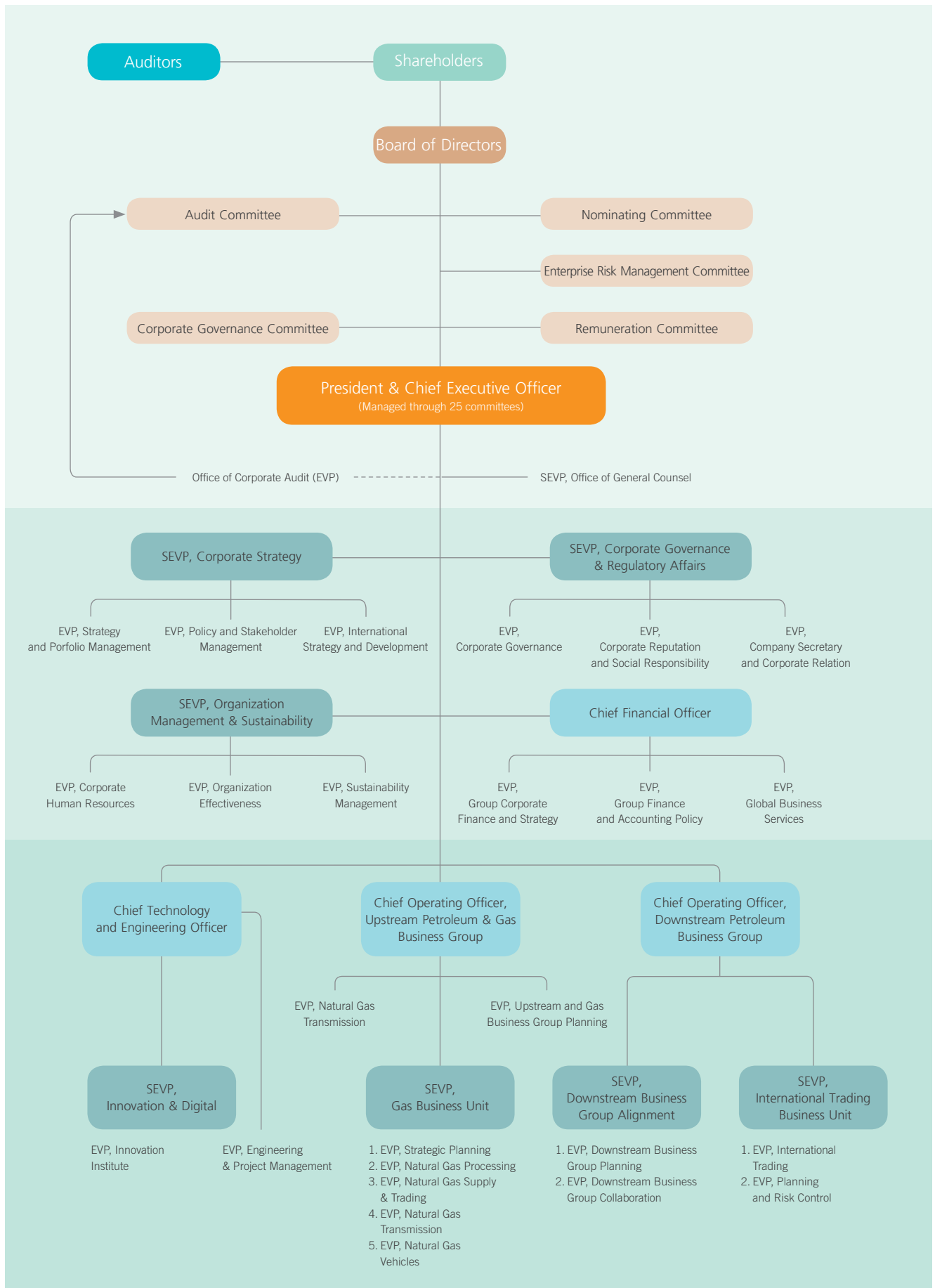
Management Structure



Responsibility of the Board of Directors

PTT Public Company Limited's structure as of January 1, 2019 comprises the Board of Directors and five specific committees to consider significant matters, namely the Audit Committee, Nominating Committee, Remuneration Committee, Corporate Governance Committee, and Enterprise Risk Management Committee. The President & CEO is the top executive who manages PTT's business groups through three groups of 25 management committees.

This year PTT established a GRC (Governance, Risk, Compliance) unit under Senior Executive Vice President, Corporate Governance and Regulatory Affairs, responsible for CG compliance and integration of CG principles, risk management, internal control, legal and corporate regulation compliance through corporate governance and development in line with PTT Way of Conduct to cope with the need to centralize and integrate the operations of all lines of business to ensure that the operations of PTT Group are transparent and comply with good governance and drive the company with efficiency and effectiveness sustainably under the management concept "Three Lines of Defense".



Remark: EVP = Executive Vice President

Composition of the Board

Under PTT's Articles of Association, the Board consists of:

- 5-15 persons
- A minimum of three independent directors (PTT's CG principles requires that independent directors account for no less than a half of the Board)
- At least one director must be knowledgeable in accounting and finance.

According to the certification of the Ministry of Commerce dated January 18, 2019, PTT Board of Directors consists of 15 directors as follows:

- 14 non- executive directors (11 of whom are independent directors, which exceeds half of the Board)
- One executive director.
- One female director.

The current Board consists of:

No.	Name	Position as of December 31, 2018	Appointed Date
1.	Mr. Krairit Euchukanonchai	Independent director/ Chairman of the Board (Director from July 11, 2018, and Chairman of the Board from September 7, 2018)	July 11, 2018 (First term)
2.	Prof. Dr. Kittipong Kittayarak	Independent director/ Chairman of the Audit Committee	July 1, 2014 (First term) April 28, 2017 (Second term)
3.	Mr. Don Wasantapruek	Independent director/ Chairman of the Nominating Committee	July 26, 2014 (First term) April 11, 2016 (Second term)
4.	Mr. Vichai Assarasakorn	Independent director/ Chairman of the Remuneration Committee/ Member of the Audit Committee	September 4, 2014 (First term) April 28, 2017 (Second term)
5.	Gen. Chatchalerm Chalermasukh	Independent director/ Chairman of the Corporate Governance Committee	September 4, 2014 (First term) April 11, 2016 (Second term)
6.	Mr. Thon Thamrongnawasawat	Independent director/ Chairman of the Enterprise Risk Management Committee/ Member of the Corporate Governance Committee	November 18, 2016 (First term) April 12, 2018 (Second term)
7.	Mrs. Nuntawan Sakuntanaga	Independent director/ Member of the Audit Committee	July 1, 2014 (First term) April 9, 2015 (Second term) April 12, 2018 (Third term)
8.	Mr. Supot Teachavorasinskun	Independent director/ Member of the Nominating Committee	January 18, 2018 (First term)
9.	Prof. Dr. Surapon Nitikraipot	Independent director/ Member of the Nominating Committee/ Member of the Corporate Governance Committee	April 12, 2018 (First term)

No.	Name	Position as of December 31, 2018	Appointed Date
10.	Mr. Somsak Chotrattanasiri	Independent director/ Member of the Remuneration Committee	April 22, 2015 (First term) April 28, 2017 (Second term)
11.	Mr. Chumpol Rimsakorn	Director/ Member of the Remuneration Committee	December 21, 2018 (First term)
12.	Mr. Danucha Pichayanan	Independent director/ Member of the Enterprise Risk Management Committee	April 12, 2018 (First term)
13.	Mr. Thammayot Srichuai	Director/ Member of the Enterprise Risk Management Committee	December 15, 2016 (First term) April 28, 2017 (Second term)
14.	Mr. Chansin Treenuchagron	Director and Secretary of the Board (President & CEO)	August 31, 2018 (First term)

Note:

In 2018 the Board appointed new directors to replace those that either completed their terms and/or resigned during this year as follows:

- No. 1: Mr. Krairit Euchukanonchai was appointed as an independent director with effect from July 11, 2018, replacing Mr. Piyasvasti Amranand, who retired from the directorship of PTT due to his completion of sixty five years of age, effective from July 11, 2018; and Chairman of the Board with effect from September 7, 2018.
- No. 8: Mr. Supot Teachavorasinskun was appointed as an independent director with effect from January 18, 2018, replacing Mr. Boontuck Wungcharoen, who tendered his resignation on December 31, 2017.
- No. 9: Prof. Dr. Surapon Nitikraipot was appointed as an independent director with effect from April 12, 2018, replacing Mr. Somkit Lertpaitoon, who completed his term on April 12, 2018.
- No. 11: Mr. Chumpol Rimsakorn was appointed as a director with effect from December 21, 2018, replacing Mr. Krisada Chinavicharana, who tendered his resignation on November 30, 2018. Mr. Krisada Chinavicharana was appointed as a director with effect from June 1, 2018, replacing Mr. Somchai Sujjapongse, who tendered his resignation on May 1, 2018.
- No. 12: Mr. Danucha Pichayanan was appointed as an independent director with effect from on April 12, 2018, replacing Mr. Chanvit Amatamatucharti, who completed his term on April 12, 2018.
- No. 14: Mr. Chansin Treenuchagron was appointed as a President and CEO / director and secretary to the Board with effect from August 31, 2018, replacing Mr. Tevin Vongvanich, who completed his term as President & CEO on August 31, 2018.

PTT directors appointed in January 2019

No.	Name	Position	Appointed Date
1.	Mr. Nuttachat Charuchinda	Director	January 16, 2019 (First term)
2.	Mr. Kulit Sombatsiri	Director	January 16, 2019 (First term)

Note:

The Board appointed new directors to replace those that either completed their terms and/or resigned in 2019, or both:

- No. 1: Mr. Nuttachat Charuchinda was appointed as a director with effect from January 16, 2019, replacing AM Boonsuib Prasit, who retired from the directorship of PTT due to his completion of sixty five years of age, effective from December 23, 2018.
- No. 2: Mr. Kulit Sombatsiri was appointed as a director with effect from January 16, 2019, replacing Mr. Thammayot Srichuai, who resigned with effect from January 1, 2019.

1.2 Authority and Responsibilities of the Board

- The Board is authorized to supervise and oversee PTT's management in compliance with applicable laws, objectives, articles of association, and resolutions of shareholders' meetings.
- The Board is authorized to select one director to serve as the Chairman and may select Vice Chairman if appropriate.
- The Board is authorized to select one director to serve as President & CEO and Secretary to the Board as appropriate.

Duties and Responsibilities:

The Board is to:

- Carry out its duties under PTT's Articles of Association and ensure that the management complies with applicable laws, objectives, Articles of Association and resolutions of shareholders' meetings.
- Define PTT's vision, directions, strategies, policies and major plans and consider potential risks so as to ensure that the 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, and efficient and effective internal control and internal audit systems.
- Oversee and supervise issues regarding conflicts of interest and related transactions.
- Define comprehensive risk management guidelines and ensure an efficient risk management system or process.
- Ensure a suitable compensation system or mechanism for senior management to induce short-term and long-term motivation.
- Assess the performance of the President & CEO and decide suitable compensation.
- Ensure suitable communicating channels with each group of shareholders and stakeholders.
- Ensure accurate, clear, transparent, reliable, and high-quality disclosure of information.
- Express leadership and be a role model.

The Board's additional authority includes:

- Approve long-term investment, 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 procurement-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.
- Appoint the Company Secretary.

Authorized Directors to Sign and Bind for PTT

According to PTT's Articles of Association, as of January 18, 2019, the directors whose signatures are authorized to sign to bind PTT are either (1) Mr. Chansin Treenuchagron, President & CEO, to sign and affix PTT's seal, or (2) Two out of these three directors: Mr. Don Wasantpruek, Mr. Supot Teachavorasinskun, or Prof. Dr. Surapon Nitikraipot jointly sign and affix PTT's seal.

Appointment and Dismissal of Directors

1. The Board consists of 5 - 15 persons appointed at shareholders' meetings. In addition, it consists of a minimum of 3 independent directors and at least half of the directors must reside in the Kingdom. At least one of them must be knowledgeable in accounting and finance. All directors must have qualifications as specified by law and PTT's Articles of Association. Since 2004, the Board has a resolution that the Board of directors must comprise at least half of independent directors, a requirement that remains effective until present. As of January 18, 2019, it had 11 independent directors, one female director, all of whom reside in Thailand. Six directors are experts in accounting and finance, namely Mr. Krairit

Euchukanonchai, Mr. Somsak Chotrattanasiri, Mrs. Nuntawan Sakuntanaga, Mr. Vichai Assarasakorn, Mr. Kulit Sombatsiri and Mr. Chansin Treenuchagron.

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 number 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 position is vacated because of other reasons beside the term completion, the Board may elect a qualified person without the prohibitions as stipulated under PTT's Articles of Association, to fill the vacancy at the next Board meeting, except the remaining term of the vacated director is less than two months. The acting director must secure at least three-quarters of the votes by the remaining directors. He can also stay in office only for the remaining term of the former director.

5. Any director who wish 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. In voting to remove any director from directorship before the completion of his term, a three-quarter vote of eligible shareholders present at the meeting is required. The number of shares represented by the three-quarter votes of at least half of the total number of shares represented by the eligible shareholders present at the meeting is also required.

Qualifications of Directors

Directors must be duly qualified, without the prohibitions stated in the Public Limited Companies Act and the Standard Qualifications for Directors and State Enterprise Employees Act, 1975 [B.E. 2518] and its amendments, as well as relevant Cabinet resolutions, including:

- Up to 65 years of age.
- A maximum of three directorships in state enterprise or in a juristic person in which State enterprise holds shares, including appointments due to their positions and those due to acting assignments.
- Independent directors must be qualified under SET's notification on the qualifications and scope of work of the audit committees B.E. 2558 (2015).
- Never been sentenced to imprisonment, except for violations of the law by negligence or petty offence.
- Not being a political official, except for holding a directorial position pursuant to a provision of law.
- Not being a person holding any position in a political party or an official of political party.
- Never been expelled, dismissed, or made to leave a position because of malfeasance.
- Not being 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 governments, provincial governments, local governments or other government units. 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.
- Not being a person holding any position in a juristic person in which such State enterprise holds shares, except where entrusted by the board 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.
- Not being a director or an executive or a person having authority in the management or an interest in a juristic person who is a concessionaire or joint venture party, or having an interest relating 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.

In 2018, Under the Corporate Governance and Code of Conduct Handbook, Revision 4, 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.

However, Independent directors and members of specific committee 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 January 18, 2019, 11 out of 15 PTT directors' names were listed in the Director's Pool.

Board Meetings

Board meetings are planned for the entire year. For 2018, the meetings were held on the third Friday of each month. Additional meetings may be called to discuss special items as necessary. The Office of the President and Corporate Secretary issues a meeting notice along with the meeting agenda with details, reasons, and sufficient accompanying documents for decision-making to each director seven days ahead of the meeting to allow the directors enough time to prepare themselves.

Since 2004, Board meetings have been made electronic in which meeting agenda items are put on a CD format. Since 2013, the meetings agenda and accompanying documents have been conducted through iPad application software for convenience. This requirement has considerably reduces copy of documents also shortens the process, speeds up execution of the agenda, and eases decision-making of management with efficient information access.

Since 2015, the Board has set "sequel agenda" to report the progress of the previously proposed agenda items and to follow up the operations implemented based on the meeting's observation and comments, with the corporate strategies being applied. The agenda must be reported monthly in the meeting.

The Board has set a policy that meeting documents on particular agenda items will not be forwarded to directors with potential conflicts of interest on such matters. The directors will abstain from attending and voting during that portion of the meeting. At least a quorum of two-thirds of eligible directors is required to pass the Board's resolution. If the quorum is not met, discretion of Chairman will be applied as stipulated in the CG Handbook.

The minutes of each meeting for each agenda item will be properly documented with all written comments and recommendations. After the adoption from the Board was given, meeting minutes will be filed for auditing purposes and reference by directors. By and large, each board meeting lasted approximately three hours.

In 2018, PTT held 16 Board meetings (12 regular and 4 special). The special meetings, held annually, aimed to determine/review/approve PTT Group's vision and missions, directions and operational strategies (five-year rolling). This year the Board and the management jointly reviewed vision and missions and approved directions and operational strategies as a framework and guideline for business units, subsidiaries and associates to formulate the annual state enterprise plans and budgets of 2019 - 2023. In addition, one Board meeting was conducted in the absence of the management in February 2018 on "The Audit Committee's Hiring of Legal Experts" to provide legal consultation, opinion and advice and prepare legal strategic plans for the Board and the Audit Committee. One independent directors meeting was held in November 2018 on "Managing Tough Issues in ID Meeting" at which the potential issues which might arise from performing the duty of independent directors at the meeting were discussed. At every meeting the Chairman allowed directors to freely and openly express their views. Details of directors' meetings are summarized as follows:

Name	Board Meetings in 2018						Appointment during the year
	Board of Directors (Total 16)	Audit Committee (Total 17)	Corporate Governance Committee (Total 6)	Nominating Committee (Total 6)	Remuneration Committee (Total 3)	Enterprise Risk Management Committee (Total 5)	
1. Mr. Krairit Euchukanonchai	7/7						July 11, 2018 (replacing Mr. Piyasvasti Amranand)
2. Prof. Dr. Kittipong Kittayarak	16/16	17/17					-
3. Mr. Don Wasantapruek	16/16		6/6				-
4. Mr. Vichai Assarasakorn	16/16	17/17			1/1		-
5. Gen. Chatchalerm Chalermsook	16/16		6/6				-
6. Mr. Thon Thamrongnawasawat	14/16		6/6	3/3		4/4	-
7. Mrs. Nuntawan Sakuntanaga	13/16	15/17					-
8. Mr. Supot Teachavorasinskun	15/16			2/3			January 18, 2018 (replacing Mr. Boontuck Wungcharoen)
9. Prof. Dr. Surapon Nitikraipot	10/11			3/3			April 12, 2018 (replacing Mr. Somkit Lertpaitoon)
10. Mr. Somsak Chotrattanasiri	16/16				3/3		-
11. Mr. Chumpol Rimsakorn	1/1						December 21, 2018 (replacing Mr. Krisada Chinavicharana)
12. Mr. Danucha Pichayanan	9/11					4/4	April 12, 2018 (replacing Mr. Chanvit Amatamatucharti)
13. Mr. Thammayot Srichuai	16/16					5/5	Mr. Thammayot Srichuai resigned with effect from January 1, 2019.
14. Mr. Chansin Treenuchagron	5/5						August 31, 2018 (replacing Mr. Tevin Vongvanich)

Attendance Record of Retired / Resigned Directors for 2018 (Total: 7 Directors)

Name	Meeting Attendance 2018						Appointment during the year
	Board of Directors (Total 16)	Audit Committee (Total 17)	Corporate Governance Committee (Total 6)	Nominating Committee (Total 6)	Remuneration Committee (Total 3)	Enterprise Risk Management Committee (Total 5)	
1. Mr. Piyasvasti Amranand	9/9						retired from the directorship of PTT due to his completion of sixty five years of age, effective from July 11, 2018.
2. Mr. Chanvit Amatamatucharti	5/5			2/2		1/1	Completed his term on April 12, 2018.
3. Mr. Somkit Lertpaitoon	5/5					1/1	Completed his term on April 12, 2018.
4. Mr. Somchai Sujjapongse	2/6				2/2		Resigned with effect from May 1, 2018.
5. Mr. Krisada Chinavicharana	8/8				1/1		Resigned with effect from November 30, 2018
6. AM Boonsuib Prasit	16/16			6/6			retired from the directorship of PTT due to his completion of sixty five years of age, effective from December 23, 2018.
7. Mr. Tevin Vongvanich	11/11						completed his term as President & CEO effective from August 31, 2018.

Note:

A total of 16 Board meetings were held during the year (12 regular and 4 special meetings)

* Reasons for meeting absence were prior scheduled overseas trips and official engagement. Apologies letters were duly forwarded to the Chairman ahead of the meeting.

Corporate Management

Management team members as of December 31, 2018:

(PTT Organization Chart is detailed under “Responsibility of the Board”)

Name	Position
1. Mr. Chansin Treenuchagorn ^{1/}	President & CEO
2. Mr. Wirat Uanarumit	Chief Operating Officer, Upstream Petroleum & Gas Business Group
3. Mr. Auttapol Rerkpiboon ^{2/}	Chief Operating Officer, Downstream Petroleum Business Group
4. Mr. Wittawat Svasti-xuto ^{3/}	Chief Technology and Engineering Officer
5. Ms. Pannalin Mahawongtikul ^{4/}	Acting Chief Financial Officer
6. Mrs. Arawadee Photisar ^{5/}	Acting Senior Executive Vice President, Corporate Strategy
7. Mr. Preecha Pocatana ^{6/}	Acting Senior Executive Vice President, Organization Management and Sustainability
8. Mr. Kris Imsang ^{7/}	Senior Executive Vice President, Corporate Governance and Regulatory Affairs
9. Ms. Peangpanor Boonklum	Senior Executive Vice President, Office of General Counsel
10. Mr. Noppadol Pinsupa	Senior Executive Vice President, Gas Business Unit
11. Ms. Duangporn Thiengwatanatham ^{8/}	Acting Senior Executive Vice President, Downstream Business Group Alignment
12. Mr. Disathat Panyarachun ^{9/}	Acting Senior Executive Vice President, International Trading Business Unit
13. Mr. Worawat Pitayasiri ^{10/}	Acting Senior Executive Vice President, Innovation and Digital
14. Mr. Phongsthorn Thavisin ^{11/}	Senior Executive Vice President, seconded to CEO, PTT Exploration and Production Plc
15. Mr. Supattanapong Punmeechaow	Senior Executive Vice President, seconded to President and CEO, PTT Global Chemical Plc.
16. Mr. Atikom Terbsiri	Senior Executive Vice President, seconded to President and CEO, Thaioil Plc.
17. Mr. Sukrit Surabotsopon	Senior Executive Vice President, seconded to President, IRPC Plc
18. Ms. Jiraphon Kawswat ^{12/}	Senior Executive Vice President, seconded to Acting President and CEO, PTT Oil and Retail Business Plc.
19. Mr. Chawalit Tippawanich ^{13/}	Acting Senior Executive Vice President, seconded to President and CEO, Global Power Synergy Plc.

Name	Position
20. Ms. Duangkamol Settanung ^{14/}	Senior Executive Vice President, seconded to Senior Executive Vice President, Finance and Accounting, PTT Global Chemical Plc.
21. Mr. Sumrid Sumneing ^{15/}	Executive Vice President, Group Corporate Finance and Strategy
22. Ms. Wilaiwan Kanjanakanti	Executive Vice President, Group Finance and Accounting Policy
23. Mr. Chienvit Udomwatwong	Executive Vice President, Global Business Services

Note:

No. 1-5 are considered "Management" under SEC's notification.

1/ Appointed on August 31, 2018, replacing Mr. Tevin Vongvanich, who completed his term as President & CEO.

2/ Holding the additional position of Acting SEVP, Downstream Business Group Alignment, during the period from October 1, 2017 to September 30, 2018.

3/ Appointed on September 16, 2018, replacing Mr. Chansin Treenuchagron, who was appointed as President & CEO.

4/ Appointed on October 1, 2018, replacing Mrs. Nitima Thepvanangkul, who retired.

5/ Appointed on October 1, 2018, replacing Mrs. Sriwan Eamrunroj, who retired.

6/ Appointed on October 1, 2018, replacing Mr. Kris Imsang, who was appointed as SEVP, Corporate Governance and Regulatory Affairs.

7/ Appointed on October 1, 2018, in line with restructuring, with a new unit established to oversee corporate governance and regulatory affairs for efficient management.

8/ Appointed on October 1, 2018, replacing Mr. Auttapol Rerkpiboon, who held to an additional position of Acting SEVP, Downstream Business Group Alignment during the period from October 1, 2017, to September 30, 2018.

9/ Appointed on October 1, 2018, replacing Mrs. Boobpha Amornkiatkajorn, who retired.

10/ Appointed on September 16, 2018, replacing Mr. Wittawat Svasti-xuto, who was appointed as Chief Technology and Engineering Officer.

11/ Appointed on October 1, 2018, replacing Mr. Somporn Vongvuthipornchai, who retired.

12/ Appointed on July 1, 2018 as a result of restructuring to assign PTT Oil and Retail Business Plc. (PTTOR) as the flagship of PTT Group in the oil and retail business.

13/ Appointed on October 1, 2018, replacing Mr. Toemchai Bunnag, who retired.

14/ Appointed on December 1, 2018.

15/ Appointed as EVP on January 1, 2019, seconded to SEVP, Finance and Accounting Group, PTT Exploration and Production, Plc.

Executives appointed from January 1 to February 1, 2019

Name	Position
1. Mr. Yongyos Krongphanich	PTTEP executive, seconded to EVP, Group Corporate Finance and Strategy, PTT, with effect from January 1, 2019, replacing Mr. Sumrid Sumneing.
2. Mr. Wuttikorn Stithit	Acting SEVP, Gas Business Unit, with effect from February 1, 2019, replacing Mr. Noppadol Pinsupa, who was appointed as SEVP, PTT, and seconded to President, IRPC Plc. (replacing Mr. Sukrit Surabotsopon, who resigned before retirement).
3. Mr. Sukrit Surabotsopon	Senior Executive Vice President, seconded to President, IRPC Plc, who resigned before retirement with effect from February 1, 2019)

Duties and Responsibilities of the President & CEO

Under PTT's Articles of Association, the President is authorized and responsible for managing Board-assigned PTT's overall business. The business shall be strictly and prudently managed with integrity under the Board-approved plans or budget for 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, reducing the salary or wages of, taking disciplinary action against, and dismissing any employees 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 against them 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 of authority:

- Manage overall business under the objectives, Articles of Association, policies, rules and regulations, specifications, directives, and resolutions of the Board or shareholders' meetings, or both.
- 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, cutting the salary or wages of, taking disciplinary action against or dismissing any employees 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 with the rules, regulations, and directives of the Board.
- Assign the power of attorney and/or delegate specific tasks to other persons, provided that the action complies with the document concerning 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 in case of conflicts 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 February 4, 2019, the Committee consists of 15 members:

Name	Position
1. President & CEO	Chairman
2. Chief Operating Officer, Upstream Petroleum & Gas Business Group	Member
3. Chief Operating Officer, Downstream Petroleum Business Group	Member
4. Chief Technology and Engineering 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 Digital	Member
10. Senior Executive Vice President, Organization Management and Sustainability	Member
11. Senior Executive Vice President, Office of General Counsel	Member
12. Senior Executive Vice President, Corporate Governance and Regulatory Affairs	Member
13. Senior Executive Vice President, seconded to PTT Oil and Retail Business Plc.	Member
14. Senior Executive Vice President, Corporate Strategy	Member and Secretary
15. Executive Vice President, Company Secretary and Corporate Relation	Assistant Secretary

The Management Committee meets at least three times a month. This year there were altogether 46 meetings (42 regular and 4 special meetings).

Duties and Responsibilities

Provide advice and recommendations to the President & CEO 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 uniformity of PTT's operations.

PTTMC also provides consultation and recommendations to the President & CEO and promotes operation in the following matters:

- Sets the visions and major responsibilities for PTT Group.
- Set business directions, strategies, and business targets for the group along with performance targets of business units and the group as a whole.
- Define direction for corporate governance monitoring and integration of Governance, Risk and Compliance of PTT Group
- Consider the capital allocation structure (budget and resources) to support future investments and operations of PTT and PTT Group (PTT Group's Capital Allocation Structure).
- Consider investment management of PTT and PTT Group (PTT Group's Portfolio Management).
- Consider and monitor PTT's extended international investment.
- Establishes a policy on human resource management, prepares and develops the group's management of level 14 up in a systematic, professional way to be ready for its future missions in line with the Leadership Affiliation and Alignment Program.
- Screens and provides opinions and recommendations on the establishment of standards/ mechanisms for the systems of business administration, human resources and information, as well as business process and the organizational structure of PTT and its affiliates in order to be a corporate of sustainability excellence.
- Considers, screens, defines policies and principles for the PTT Way of Conduct, and ensures that it is carried out in the desired directions.
- Ranks significant matters about the allocation of human and financial resources of PTT and its affiliates.
- Jointly resolves significant conflicts between PTT's upstream and downstream petroleum and technology and engineering businesses.
- Follows up the progress and assesses the performance of the group against KPIs (PAs & KPIs)
- Scrutinizes risk management in business operations of the group.
- Screens meeting agendas before presenting to the Board.
- Ranks Board decisions to ensure effective implementation.
- Appoints committees and/or working groups, or both, to assist the Board's tasks.
- Performs other work as may be assigned by the President & CEO.

To efficiently manage PTT Group to drive the strategies and operations of the companies to achieve their goals, PTT has divided its committees into three groups:

1. Strategy Committees:

- 1.1 PTT Group Management Committee: PTTGMC
- 1.2 PTT Management Committee: PTTMC
(as mentioned above).

2. Coordination Committees:

- 2.1 Upstream & Gas Business Group Alignment & Coordination Management Committee (UAC)
- 2.2 Downstream Business Group Alignment & Coordination Committee (DAC)
- 2.3 Technology and Engineering Group Alignment & Coordination Management Committee (TEAC)
- 2.4 PTT Group Technology Committee (PTTGTC)
- 2.5 Sustainability Alignment Committee (SAC)
- 2.6 Gas Business Strategic Alignment Committee (GBSC)
- 2.7 Oil Business Strategic Alignment Committee (OBSC)
- 2.8 Downstream Petroleum Business Group Strategic Alignment Committee (DBSC)
- 2.9 Trading Business Strategic Alignment Committee (TBSC)
- 2.10 Trading Risk Management Committee (TRMC)

3. Support Committees:

- 3.1 Corporate Plan and Risk Management Committee (CPRC)
- 3.2 Governance Risk and Compliance Management Committee
- 3.3 Human Resources Group Alignment & Coordination Management Committee (HRAC)
- 3.4 Finance & Accounting Group Alignment & Coordination Management Committee (FAAC)
- 3.5 PTT Group KM Committee
- 3.6 PTT Group Internal Audit Management Committee
- 3.7 PTT Group Digital Steering Committee
- 3.8 PTT Group Policy & Strategic Sourcing Committee
- 3.9 PTT Group Quality, Security, Safety, Health, and Environment Management Committee (QSHEGMC)
- 3.10 PTT Group Brand Equity Optimization Committee.
- 3.11 PTT Group Operational Excellence Committee
- 3.12 PTT Group Corporate Governance Committee
- 3.13 PTT Group CSR Committee.

Company Secretary:



Mrs. Wantanee Jaruke

Company Secretary
(since December 1, 2013)

Age: 58

Number of shares held:
0.000430%

Education:

- Bachelor of Arts (German), Chiang Mai University
- Master of Business Administration, Kasetsart University

Company Secretary Training Record:

- The Thai Institute of Directors Association (IOD):
Company Secretary Program (CSP 2/2002),
Effective Minutes Taking (EMT 1/2006),
Board Reporting Program (BRP 9/2012),
Company Reporting Program (CRP 4/2012),
Anti-Corruption the Practical Guide (ACPG 11/2014),
Corporate Governance for Executives (CGE 1/2014),
Director Certification Program (DCP 215/2016),
Ethical Leadership Program (ELP)
- TLCA: Executive Development Program (EDP 7),
Thai Listed Companies Association
- Company Secretaries, Trueeventus, the Philippines (2013)
- Leadership Development Program,
Centre for Creative Leadership, Singapore (2015)
- Professional Exchange Program,
Hong Kong Institute of Chartered Secretaries, Hong Kong, (2016).
- Good Governance for Sustainable Development for
Senior Executives, Class 5,
Institute for Good Governance Promotion,
Office of the Public Sector Development Commission (OPDC)
(February - September 2018)
- Advanced Management Program, PTT (March 2018)
- Leadership Development Program (LDP) 2, Class 3,
PTT (April - September 2018)

Company Secretary

To comply with the CG principles for listed companies contained under the category of “Directors’ Responsibility” and the terms of the Securities and Exchange Act, the Board has designated a Company Secretary to provide the Board with legal advice and related regulations that they need to know and comply with; organize meetings; supervise Board activities to enable them to perform efficiently and effectively for the maximum benefit to PTT; prepare and maintain critical documents, including directors’ registration, Board meeting notices and minutes, annual reports; issue shareholders’ meeting notices and minutes, and keep reports of the interests of directors and managements.

The position of Company Secretary was established in 2008. Mrs. Wantanee Jaruke served as the Company Secretary from December 1, 2013 to present.

Professional Experience:

- 2002- 2005
Expert, Office of the President and Corporate Secretary, PTT
- 2006 - 2013
Team Leader, Office of the President and Corporate Secretary, PTT
- 2013 - 2018
Vice President,
Office of the President and Corporate Secretary, PTT
- 2018 - Present
Executive Vice President, Company Secretary
and Corporate Relation.

Related Important Positions Held: None

Extra Activity:

- Chairman of the Committee of Thai Company Secretary Club,
Thai Listed Companies Association
- Executive Committee of the Chulalongkorn University
Preparatory School Alumni Association (CUPSAA), Class 38

Relationship with Executives: None.

Remuneration of Directors and the Management

With the validation of the Remuneration Committee, PTT fairly and sensibly specifies the compensation for directors, taking into account each director's responsibility, its financial performance, and compatibility with industry peers. Compensation consists of meeting allowances and bonuses. Directors appointed to the committees receive additional allowances for additional responsibilities. Shareholder-approved directors' compensation rates are as follows:

Directors' Compensation

Directors' Compensation

The following compensation structure for the Board was approved at the 2018 AGM on April 12, 2018:

1. Monthly and Meeting Allowances

1.1 Board meeting compensation consisted of:

- Monthly allowance of THB 30,000 per month (same rate as last year)
- Meeting allowance of THB 50,000 for each meeting (same rate as last year) for those in attendance only. Payment of meeting allowances must not exceed once a month (versus the previous limit of up to 15 times per year).

1.2 Compensation for other committee meetings (same rate as last year but payment of meeting allowances has a limit of once a month) consisted of:

1.2.1 **Audit Committee**

- Monthly allowance of THB 15,000 per month
- Meeting allowance of THB 15,000 for each meeting for those in attendance only, whereas the Secretary received a monthly allowance of THB 7,500.

1.2.2 Compensation for other committees, namely **the Nominating, Remuneration, Corporate Governance, Enterprise Risk Management Committees** and other sub-committees to be appointed by the Board as necessary, consisted of a meeting allowance of THB 24,000 for each meeting for those in attendance only.

1.3 Compensation for the Chairman of the Board and the Chairman of each committee was 25% higher than for other members.

Directors' Bonuses in 2018 (same rate as last year)

Bonus payouts for each director, at 0.05% of the net profit of 2018, corresponded to PTT's performance and net profit, with a maximum limit of THB 3 million per person (same rate as last year). Bonuses were prorated to each director's term, with the Chairman receiving 25% more than individual directors.

Remuneration for Directors in 2018

Unit : Baht

No.	Name	Days of Service Jan - Dec 2018	Bonus 2018	Meeting Allowance (Inclusive of Monthly Allowance)	Meeting Allowance Specific Committee	Total Allowance	Total Remuneration
1	Mr. Krairit Euchukanonchai	174	1,787,671.23	548,822.58	-	548,822.58	2,336,493.81
2	Prof. Dr. Kittipong Kittayarak ^{a/}	365	3,000,000.00	960,000.00	498,000.00	1,458,000.00	4,458,000.00
3	Mr. Don Wasantapruerk ^{a/}	365	3,000,000.00	960,000.00	168,000.00	1,128,000.00	4,128,000.00
4	Mr. Vichai Assarasakorn ^{a/}	365	3,000,000.00	960,000.00	420,000.00	1,380,000.00	4,380,000.00
5	Gen. Chatchalerm Chalermasukh ^{a/}	365	3,000,000.00	960,000.00	240,000.00	1,200,000.00	4,200,000.00
6	Mr. Thon Thamrongnawasawat	365	3,000,000.00	960,000.00	336,000.00	1,296,000.00	4,296,000.00
7	Mrs. Nuntawan Sakuntanaga	365	3,000,000.00	910,000.00	360,000.00	1,270,000.00	4,270,000.00
8	Mr. Supot Teachavorasinskun	348	2,860,273.97	893,548.38	48,000.00	941,548.38	3,801,822.35
9	Prof. Dr. Surapon Nitikraipot	264	2,169,863.01	659,000.00	72,000.00	731,000.00	2,900,863.01
10	Mr. Somsak Chotrattanasiri ^{a/}	365	3,000,000.00	960,000.00	96,000.00	1,056,000.00	4,056,000.00
11	Mr. Chumpol Rimsakorn	11	90,410.96	60,645.16	-	60,645.16	151,056.12
12	Mr. Danucha Pichayanan	264	2,169,863.01	609,000.00	96,000.00	705,000.00	2,874,863.01
13	Mr. Thammayot Srichuai ^{a/}	365	3,000,000.00	960,000.00	168,000.00	1,128,000.00	4,128,000.00
14	Mr. Chansin Treenuchagron ^{b/}	123	1,010,958.90	320,967.74	-	320,967.74	1,331,926.64
Total			34,089,041.08	10,721,983.86	2,502,000.00	13,223,983.86	47,313,024.94

a/ Includes the meeting allowance of Nominating Committee and Remuneration Committee during the process of PTT's President & CEO nomination.

b/ **Mr. Chansin Treenuchagron returned all of his remuneration paid from August 31 to December 31, 2018, to PTT in compliance with his employment agreement of President & CEO.**

In addition, The President & CEO returned to PTT all the remuneration earned from August 31 to December 31, 2018, when serving as Chairman or director (or both) in two companies in PTT Group from PTT Exploration and Production Public Company Limited for THB 1,113,562.53 and IRPC Public Company Limited for THB 541,936 in compliance with the employment agreement of President.

Note:

No. 8, Mr. Supot Teachavorasinskun was appointed as a director on January 18, 2018.

No. 9, Prof. Dr. Surapon Nitikraipot was appointed as a director on April 12, 2018.

No. 11, Mr. Chumpol Rimsakorn, was appointed as a director on December 21, 2018.

No. 12, Mr. Danucha Pichayanan was appointed as a director on April 12, 2018.

No. 14, Mr. Chansin Treenuchagron was appointed as a director and Secretary to the Board on August 31, 2018.

A vehicle was provided to the Chairman to facilitate his duties only.

Retired and Resigned Directors (2018)

Unit : Baht

No.	Name	Days of Service Jan - Dec 2018	Bonus 2018	Meeting Allowance (Inclusive of Monthly Allowance)	Meeting Allowance Specific Committee	Total Allowance	Total Remuneration
1.	Mr. Piyasvasti Amranand	191	1,962,328.77	674,596.77	-	674,596.77	2,636,925.54
2.	Mr. Chanvit Amatamatucharti	102	838,356.16	302,000.00	78,000.00	380,000.00	1,218,356.16
3.	Mr. Somkit Lertpaitoon	102	838,356.16	302,000.00	24,000.00	326,000.00	1,164,356.16
4.	Mr. Somchai Sujjapongse ^{a/}	120	986,301.37	220,000.00	96,000.00	316,000.00	1,302,301.37
5.	Mr. Tevin Vongvanich ^{b/}	242	1,989,041.10	639,032.26	-	639,032.26	2,628,073.36
6.	Mr. Krisada Chinavicharana	182	1,495,890.41	479,000.00	24,000.00	503,000.00	1,998,890.41
7.	AM Boonsuib Prasit ^{a/}	356	2,926,027.40	951,290.32	228,000.00	1,179,290.32	4,105,317.72
Total			11,036,301.37	3,567,919.35	450,000.00	4,017,919.35	15,054,220.72

a/ Includes the meeting allowance of Nominating Committee and Remuneration Committee during the process of PTT's President & CEO nomination.

b/ **Mr. Tevin Vongvanich returned all of his remuneration to PTT in compliance with his employment agreement of President & CEO.**

In addition, he returned to PTT all the remuneration in 2018 when serving as Chairman or director (or both) in two companies in PTT Group: PTT Exploration and Production Public Company Limited for THB 2,374,115.83 and IRPC Public Company Limited for THB 3,918,552 under the terms of his employment agreement.

Note:

No. 1, Mr. Piyasvasti Amranand was appointed as a director on July 1, 2014, and retired from the directorship of PTT due to his completion of sixty five years of age with effect from July 11, 2018.

No. 2, Mr. Chanvit Amatamatucharti was appointed as a director on September 4, 2014, and completed his term on April 12, 2018

No. 3, Mr. Somkit Lertpaitoon was appointed as a director on February 27, 2017, and retired with effect from April 12, 2018.

No. 4, Mr. Somchai Sujjapongse was appointed as a director on November 1, 2015, and resigned with effect from May 1, 2018.

No. 5, Mr. Tevin Vongvanich was appointed as a director and secretary to the Board on September 10, 2015, and completed his term as President & CEO under his employment agreement with effect from August 31, 2018.

No. 6, Mr. Krisada Chinavicharana was appointed as a director on June 1, 2018, and resigned with effect from November 30, 2018.

No. 7, AM Boonsuib Prasit was appointed as a director on September 4, 2014, and retired from the directorship of PTT due to his completion of sixty five years of age with effect from December 23, 2018.

Directors' Remuneration Profile of 2015 - 2018

Unit: Baht

Remuneration	2015		2016		2017		2018	
	Person	Baht	Baht	Baht	Baht	Baht	Baht	Baht
Meeting Allowance	15	18,232,411.29	15	15,883,015.57	15	17,319,925.12	15	17,241,903.21
Bonuses	15	9,664,610.82	15	41,717,213.11	15	45,215,753.42	15	45,125,342.45
Total		27,897,022.11		57,600,228.68		62,535,678.54		62,367,245.66

Note:

2015, 2016, 2017 and 2018 Directors' remuneration as shown in the table including the remuneration of Mr. Tevin Vongvanich and Mr. Chansin Treenuchagron which already returned to PTT.

Remuneration to Independent Directors Serving as Independent Directors of Subsidiaries* in 2018

Remuneration to those serving as independent directors of PTT Global Chemical Plc (PTTGC):

Unit: Baht

Name	Director's Remuneration		Committee Meeting Allowance	Total Remuneration
	Bonus	Meeting Allowance and Monthly Allowance		
Mr. Don Wasantapruek	3,278,688.52	990,000.00	80,000.00	4,348,688.52

* According to the new International Financial Reporting Standards.

Management's Remuneration

Management's Remuneration

The Board defined the policy and criteria regarding management's remuneration to correspond to PTT performance under the Performance Agreement (PA), the assessment system of state enterprises stipulated by the Ministry of Finance. The President & CEO, all executives and management jointly defined KPIs as business operation directions and in assessing the President & CEO, executives and management. The Remuneration Committee decided the remuneration of the President & CEO, which reflected performance management, taking into account practices and standards of leading companies with similar businesses. Three criteria used in the performance assessment were PTT's performance, management capacity and leadership, and performance outcomes under the vision. The decisions on both criteria and the final amount of compensation are subject to the Board approval.

According to SEC's definition, PTT's "Management" included the President & CEO; Chief Operating Officer, Upstream Petroleum & Gas Business Group; Chief Operating Officer, Downstream Petroleum Business Group; Chief Technology and Engineering Officer; and Chief Financial Officer. The compensation paid to the management (excluded those seconded to PTT affiliates and those from PTT affiliates seconded to PTT) are detailed below:

Total Remuneration Paid to Top Management (excluding President & CEO) in 2018

Unit: Baht

Remuneration	2018				
	President & CEO*	Management (under SEC criteria)		Total	
		Person	Baht	Persons (incl. President & CEO)	Baht
Salary	34,754,000	4	28,176,910	5	62,930,910
Bonus	10,716,399	4	13,956,069	5	24,672,468
Total	45,470,399		42,132,979		87,603,378

Note:

- * - The remuneration of Mr. Tevin Vongvanich, as appointed the President & CEO during 1 January - 30 August 2018, and Mr. Chansin treenuchagron as appointed the President & CEO during 31 August - 31 December 2018.
- The salary of the President & CEO for Mr. Tevin Vongvanich and Mr. Chansin Treenuchagron includes an allowance for additional tasks, namely holding the position of Chairman of the Board or Directors (or both) of PTT's subsidiaries.
They have already returned PTT their remuneration earned as Chairman of the Board or Directors (or both) of PTT, PTTEP, and IRPC under the terms of their employment agreements.

Total Remuneration Paid to the Management from 2015 to 2018

Unit: Baht

Remuneration	2015		2016		2017		2018	
	Person	Baht	Person	Baht	Person	Baht	Person	Baht
Salary	5	51,686,336.00	5	56,614,080	5	59,587,470	5	62,930,910
Bonus	5	17,158,259.00	5	22,617,040	5	22,880,880	5	24,672,468
Total		68,844,595.00		79,231,120		82,468,350		87,603,378

Provident Fund Contribution to the Management from 2015 to 2018

Unit: Baht

Remuneration	2015		2016		2017		2018	
	Person	Baht	Person	Baht	Person	Baht	Person	Baht
Provident Fund	4	5,086,634.00	4	3,518,977.20	4	3,632,300.50	4	3,708,690.50

Additional Information on the Board and the 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.

Employees

To PTT, Employees are the most important asset for our business, and their quality is key to its business success. PTT concentrates on the development of HR management systems compatible with technological advancement and international standards. It not only promotes both conscientious merit and business competence for its employees, but also encourages them to actively take part in public service. It is indeed through employees that PTT focuses on its development toward a sustainability organization to elevate competitiveness, respond to internal changes of a corporation in pursuit of national energy security.

Headcount and Compensation

PTT employee headcount (including those seconded to PTT's affiliates) as of December 31, 2018, stood at 3,715. PTT has continued to set its manpower plan in line with its operations under uncertain economic conditions. The focus is on allocating resources where significant value supplementation is likely or where continuing investment is needed.

The business-group headcounts from 2015 to 2018 are as follows:

Business Unit (Unit : person)	2015		2016		2017		2018	
	PTT	PTT Group	PTT	PTT Group	PTT	PTT Group	PTT	PTT Group
1. Gas	1,289	-	1,283	-	1,281	-	1,393	-
2. Oil	1,465	-	1,440	-	1,486	-	- ^{3/}	-
3. Petrochemicals and Refining	83	-	105	-	100	-	144	-
4. Technology and Engineering	342	-	492	-	507	-	380	-
5. Support staff/ secondees to PTT affiliates	1,203 ^{1/}	278 ^{2/}	1,042 ^{1/}	254 ^{2/}	1,084 ^{1/}	239 ^{2/}	1,144	654 ^{2/}
6. Subsidiaries and jointly-controlled entities	-	24,512	-	24,680	-	25,036	-	25,959
Total	4,382	24,790	4,362	24,934	4,458	25,275	3,061	26,613

Notes:

1/ Excluding PTT secondees

2/ PTT secondees

3/ On July 1, 2018, the Oil Business Unit was restructured to assign PTT Oil and Retail Business Plc. (PTTOR), along with its 1,046 employees, who were transferred under the new company; 492 other employees were seconded to it.

Remuneration for Personnel (excluding the President & CEO and the management) from 2015 to 2018

Unit : Baht

Remuneration	2015	2016	2017	2018 ^{1/}
Salary	4,000,980,185.00	4,080,267,146.00	4,282,921,717.48	4,104,427,784.01
Bonus	1,647,437,327.00	2,136,905,643.00	2,115,503,048.90	1,980,862,083.68
Provident Fund	468,316,181.00	481,014,787.00	506,518,662.19	489,326,712.01
Others (if applicable)	2,676,017,663.00	2,953,091,552.00	3,778,463,866.70	3,286,987,468.56
Total	8,792,751,356.00	9,651,279,128.00	10,683,407,295.27	9,861,604,048.26

Note:

1/ From July 1, 2018, the Oil Business Unit was restructured and became PTT Oil and Retail Business Plc. (PTTOR). Therefore, remuneration for personnel in the business unit for 2018 was only for January - June 2018.

Other Remuneration

PTT has instituted employee welfare and other compensation programs apart from salary, bonus, and provident fund contribution for the management and all employees. This is to keep with economic conditions, the cost of living, and other standards for peer companies and with PTT's current and future performance, through constant revision and improvement. For example, contribution to the provident fund has been increased, and more choices are available for employees fund contribution to promote employees' financial planning and preparation for retirement.

HR System Development and Improvement

To become a sustainability organization, PTT continues to develop and improve its processes and mechanisms for HR management to ensure higher efficiency and realize the full potential of its employees, which will lead PTT toward its goals. PTT employees are able to 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 components of PTT. To this end, it has instituted a process in which the senior management of PTT and its affiliates 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 defined individual objectives and KPIs cascaded through the ranks from the corporate, department, to the individual levels. Such objectives and indicators defined by employees then serve as a framework for performance and performance assessment standards to reflect individual performance.

PTT has applied Career Management guidelines to prepare and promote the 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) undergoes Group Leader Development, which sustains the needs of high-level 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, Human Resources & Organization Excellence, 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 downward): This internal management is specific to PTT or a PTT Group companies in developing employees to suit future operational needs. For PTT, a Corporate Human Resources Committee (HRC) was established to promote and monitor career development planning to ensure goal achievement. A Career Counseling Teams (CCT) for 16 professional groups takes charge of defining and developing individuals, providing counseling and guidance, and monitoring and following up implementation. The individual development plan is a tool for employees to set their goals and develop their career paths and add 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 do 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 recommendation 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.
 Apart from implementing HR development under the above-mentioned guidelines, PTT takes environmental issues seriously and held environmental training courses for related employees and interested parties to enhance their awareness. In 2018 the following courses were conducted:

No.	Name of the business event	Start date	End date	Location	Attendees
1.	SSHE Training 1	2/2/2018	12/3/2018	Head Office	222
2.	Basic Safety, Occupational Health and Environment	27/8/2018	23/11/2018	Head Office	41
3.	Collecting and Reporting Data on Environmental Performance for Those who Collect and Report Data (Bangkok)	25/4/2018	26/4/2018	Head Office	3
4.	Consideration and Approval of the Data on Environmental Performance for Employees	25/4/2018	26/4/2018	Head Office	12
5.	Consideration and Approval of the Data on Environmental Performance for Management (Bangkok)	27/4/2018	27/4/2018	Head Office	4
6.	Introduction & Internal auditor ISO14001:2015	12/3/2018	21/9/2018	Head Office	88
7.	Collecting and Reporting Data on environmental cost, income and investment (EMA BKK)	29/1/2018	18/6/2018	Head Office	78
8.	Collecting and Reporting Data on environmental cost, income and investment (EMA Chonburi)	22/1/2018	25/6/2018	Chonburi Gas Pipeline Operation Center	16
Total					464

In 2018 PTT held the fifth “Young People to Globalization (YP2G)” program to develop qualified personnel for new key projects and overseas posting in line with PTT’s strategies. These personnel will be assigned challenging responsibilities through the four core functions: Strategy & Planning, Business Development, Commercial & Marketing, and Engineering & Operation, which 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 “PTT Leadership and Learning Institute (PLLI), whose vision is to be the top energy leadership development institution in ASEAN in 2020, with goals in establishing standards in capacity-building of employees through the management and implementation of compulsory courses for all PTT employees in the same direction.

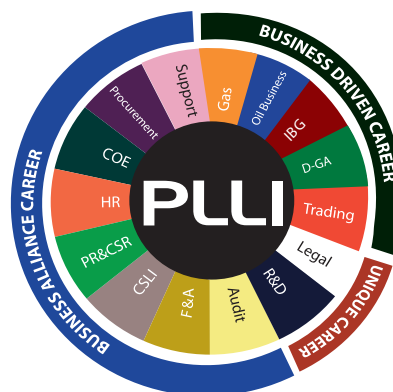
PLLI has continually provided capacity-building courses for the management and employees to be “smart and conscientious”, leadership development grooming for organization’s growth, and staff capacity-building to prepare them for corporate core competencies and strategic challenges. It has upgraded its learning and development course structure by applying new digital learning tools and media to support business direction and strategies and maximize the development of employees’ capacity and modern management. PLLI’s course structure covers the development of all employees, from the new recruits to top management, as follows:

1. Leadership Development Program to prepare and accelerate the development of PTT’s high-potential management team members to have skill, knowledge and ability in people and business management. The program concentrated on leadership, in views of self, staff, and organization through learning, knowledge-sharing and experience-sharing with world-class instructors, including learning and experience sharing of top management, internal and external.

2. Core Programs are designed to develop the capacity of all employees at each level and position. The supervisor must support the employee for training in this program. The program comprises compulsory courses, direction/ assignment, and essential program (personal wellness).

3. Functional Programs are specific courses for each professional/ group that develop the employees in each line position, from the beginners to experts. PLLI in collaboration with the Functional Academy, established by PTT, conducts this course to systematically develop corporate knowledge and encourage each unit line position to share knowledge and experience within their line position.

4. Elective Program is designed to develop the capacity of each individual needs. The line supervisor and employee will together choose the additional courses as suitable and necessary, for example, English and Presentation courses.



Summary of Human Resource Development

Hour/person/year

Training hours/ person/ year	2014	2015	2016	2017	2018
Employee	35.24	55.11	68.40	40.62	73.67
Management	22.61	30.02	20.91	25.12	73.91

Baht/person/year

Expense/ person/ year	2014	2015	2016	2017	2018
Employee & Management	55,435.37	34,476.36	35,168.35	37,837.83	55,274.35

Fostering Positive Relations between the Management and Staff in Search of the Same Goal

Communication between the management and staff at PTT comes in various forms. Needing to be aware of corporate business, obstacles, and potential repercussions, all employees should be allowed to share their views and take part in business efficiency improvement. Each year, besides the monthly labor relations committee meetings, PTT holds Joint Consultation Committee (JCC) meetings between its management team and staff of regional offices nationwide. In addition, the President & CEO not only constantly holds regular meetings with employees, but also annually surveys employees' satisfaction and engagement for views and suggestions for improvement. PTT believes that proper communication and information exchange among all staff and management will produce smooth relationships and cooperation, thus driving the organization toward goal achievement. Moreover, PTT surveys the basic human resource needs of the management and staff through the operation of various committees, such as the Human Resource Management Committee, PTT Labor Relations Committee, and Career Path Management Committee. A survey of staff opinions was undertaken by an external human resource management adviser. There was also cooperation with PTT Group to jointly develop a database of the management as well as development plans of senior management.

PTT Group Core Values

PTT Group Core Values


PTT Group defined the PTT Group core values as SPIRIT, which is significant in molding PTT management and employees to possess work behavior in the same direction, clearly reflecting PTT's identity of smart, conscientious and responsible for society, communities and the nation.

Advanced digital technologies have resulted in very challenging changes. The new business models has changed the way of business conduct, and PTT employees must adapt themselves to keep up with the world situation and apply PTT Group core values (SPIRIT) to expand their ideas and behavior in relation to digital technology, to accept and learn about it and apply it in performing their work to the maximum efficiency, performance and to move with technology and innovation drive.

SPIRIT+D

Synergy สร้างพลังร่วม อันยิ่งใหญ่
Performance Excellence ร่วมมุ่งสู่ ความเป็นเลิศ
Innovation ร่วมสร้าง นวัตกรรม
Responsibility for Society ร่วมรับผิดชอบต่อสังคม
Integrity & Ethics ร่วมสร้าง พลังความดี
Trust & Respect ร่วมสร้าง ความเชื่อมั่น
+Digitalization ขับเคลื่อนองค์กร ด้วยเทคโนโลยีดิจิทัล

HPO

-  Energy security
-  Economic prosperity
-  National sustainable growth
 - Knowledge management
 - Technology and innovation research and development

CSR

-  Create common value for society and business alike under the concept of social enterprise
-  Drive society and move forward together through CSR activities
 - Human resource development
 - Social and community development
 - Natural resources and environmental conservation
-  Manage the organization transparently
-  Form an anti-corruption network with every sector
-  Create trust and be responsive to stakeholders' expectations with balanced interest

CG

Succession Planning

Because PTT is a state enterprise, the processes of nomination and appointment of the President & CEO must follow the Standard Qualifications of Directors and State Enterprise Officer Act. Directors must possess the qualifications as specified in Article 8 ter and the nominating procedures as specified in Article 8 quarter. The Board is to appoint a Nominating Committee, with five members duly qualified and without prohibitions under the law, which nominates persons with appropriate knowledge, capability, and experience to fill the positions of PTT management. Candidates must be legitimately qualified and without prohibitions under the laws and are not PTT directors, except for management team members who are directors by title. They must not be older than 58 years old on the date of application submission. When the Nominating Committee selects appropriate candidates, it submits the results to the authority. The appointment must be completed within one year from the day the incumbent vacates the position. Each employment contract lasts up to four years for each term. If the Board

wishes to hire a previous management team member after the completion of his term as specified in the hiring contract, it does not have to go through the nominating process, but it cannot hire the person for more than two consecutive terms. In 2018 the Board proceeded with the nomination of the new President to replace Mr. Tevin Vongvanich, who completed his term on August 31, 2018. The Nominating Committee was appointed as required by the Standard Qualifications for State Enterprise Directors and Officials Act. There are five candidates applied for the position, consisting of four PTT management personnel and one non-PTT management person. The nominating process was transparently conducted in compliance with Section 8, paragraph 3, of the above-mentioned act of B.E. 2518 and its amendments. The Nominating Committee proposed a qualified candidate, Mr. Chansin Treenuchagron, to the Board for consideration. On March 16, 2018, the Board approved the Committee's proposal and appointed Mr. Chansin Treenuchagron as President & CEO, replacing Mr. Tevin Vongvanich. Mr. Chansin Treenuchagron assumed office on August 31, 2018, and his term will be completed in a year and eight months from the date of appointment since Mr. Chansin Treenuchagron will turn 60 on May 12, 2020.

PTT has been grooming top management to become qualified candidates for the next President's nomination. It has also prepared successors to replace the retiring top management from 2018 to 2022. Furthermore, PTT lays out a policy/direction to develop PTT Group's top management, and formulates the IDPs by preparing a management pool consisting of 268 management personnel and a potential pool in key areas.

In 2007, PTT set up a Group Leader Development Program (GLDP) to develop a succession plan for potential leaders to assume higher positions that become vacant, namely:

- President
- Senior Executive Vice President (SEVP) or equivalent
- Executive Vice President (EVP) or equivalent
- Vice President (VP) or equivalent.

Core responsible management parties and units are as follows:

- PTT Group Management Committee (PTTGMC)
- PTT Group Management Committee-Minor (PTTGMC-Minor)
- Human Resources Group Alignment & Coordination Management Committee (HRAC)
- Human Resources Management Committee (HRMC)
- Corporate Human Resources Committee (HRC).

Performance in 2018

- Selection of SEVP pool members from EVPs (PTT Group)
 - 34 pool members (as of December 31, 2018)
 - 36 pool members already promoted (2008 - 2018)
- Selection of EVP pool members from VPs (PTT Group)
 - 113 pool members (as of December 31, 2018)
 - 65 pool members already promoted (2009 - 2018)
- Selection of VP pool members from PTT division managers (PTT)
 - 121 pool members (as of December 31, 2018)
 - 192 pool members already promoted (2009 - 2018).

Labor Disputes

No reports of PTT labor disputes have been received over the past three years.



Corporate Governance

Corporate Governance Policy

PTT as the national energy company (officially a state enterprise) and a listed company on the Stock Exchange of Thailand (SET), PTT recognizes its vital mission of good management filled with transparency, establishing equitability among all stakeholders while striving to develop itself into a corporate governance (CG) role model. For it is convinced that management with CG will bring about fairness, investors' confidence, create long-term value for shareholders, boost all stakeholders' confidence, and give the corporation a most suitable, efficient, and effective management systems while enhancing its competitiveness for sustainable growth.

Ever since the privatization into PTT Plc. and distribution of its shares on SET in late 2001, the Board of Directors has valued CG as its guiding principles. The Articles of Association of PTT State: "The Company must have and implement a policy on its business ethics, including the ethics of its Board of Directors, senior executives, the management, and employees in compliance with good CG practices as its

code of conduct for the proper conduct of the organization with a high standard." PTT has issued its rules on CG in 2001 and revised them in 2014. The first CG Handbook was published in 2003 and delivered to each director, the management, and the employees to sign, acknowledge, and comply with. The handbook was revised regularly. The latest revision complied with SEC and SET's CG of listed companies as well as comments and recommendations from IOD's Corporate Governance Assessment Report, including The Organization for Economic Cooperation and Development, ASEAN Corporate Governance Scorecard (ASEAN CG Scorecard), Dow Jones Sustainability Index (DJSI) and best practices of leading international companies. The handbook in 4th revision was renamed "Corporate Governance, Ethical Standard, and Code of Conduct Handbook (CG Handbook). Essential provisions added to the handbook which were approved by PTT Board of Directors this year are:

- Limitation of the number of state enterprises or juristic persons where each director can hold directorship so as to increase efficiency and transparency. PTT directors can hold a director position in an enterprise or a juristic person as follows:
 - 1) A maximum of three directorship in the state enterprises and/or juristic persons of which the state enterprise is a shareholder.
 - 2) A maximum of three directorship in SET listed companies, provided that the directorships under (2) do not contradict (1). Such directorships in (1) and (2) must not exceed five.
- Revision of the duties and responsibility of the Enterprise Risk Management Committee to cover stakeholder management.

PTT has integrated CG in its vision, missions, and core values as part of its sustainable growth strategy, to become a leading Thai energy company and a high-performance organization to grow its competitiveness, focus on creating shared value (CSV), and provide appropriate returns to its stakeholders on the basis of CG principles.

Corporate Governance Policy

PTT duly reviewed its CG Policy and handbook to suit prevailing economic and social circumstances and requires all directors, the management, and employees to acknowledge it in writing and observe all policies in their work to illustrate the commitment to practical application of such policy and code of conduct to their jobs. The Board's policy on CG is as follows:

1. The Board, management, and all employees are committed to the six elements of CG: Accountability, Responsibility, Equitable Treatment, Transparency, Vision to Create Long-Term Value, and Ethics. An organization structure balances the roles of the Board, management, and shareholders.

2. Directors must perform their duties independently with full commitment, responsibility, and independence. There is a clear division of responsibilities between the Chairman and the President & CEO.

3. Playing a key role in the formulation of the corporate vision, strategies, policies, and key business plans with due regard for risk factors and suitable risk management, the Board must also ensure the credibility of PTT's accounting system, financial statements, and accounting audit.

4. Leading the rest of PTT on ethics and CG, the Board must supervise the management and solution to any conflicts of interest or related transactions.

5. The Board may appoint committees to help it screen critical issues.

6. The Board must undergo annual self-assessment to obtain a framework for its performance assessment.

7. The Board must establish a code of conduct for itself, the management, employees, and all contract employees to comply with in addition to PTT's regulations.

8. The Board must arrange for disclosure of financial and non-financial information to be carried out adequately, credibly, promptly, and fairly for all shareholders and stakeholders. To investors and the public, Corporate Communications and Investor Relations are responsible for such disclosure.

9. For fair and equitable treatment, the Board must arrange for PTT shareholders to access information through proper communication channels with PTT.

10. The Board must ensure a proper recruitment procedure for the appointment of key management personnel under a fair and transparent nomination process.

11. The Board must establish an efficient anti-corruption system to ensure that the management is aware of and values anti-corruption, as well as complying with anti-corruption measures.

PTT publicized on PTT Intranet and on its website the latest version of its "Corporate Governance, Ethical Standard, and Code of Conduct Handbook" in Thai and English for the benefit of and reference for investors and foreign interested parties together with stakeholders.

1. Shareholders' Rights

As the owners, the shareholders are entitled to determine. PTT's direction or decide on matters of significant impacts. 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.

1.1 Shareholders' Meetings

PTT schedules an annual general meeting of shareholders (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 the shareholders' approval, however, it can call an extraordinary meeting of the shareholders.

This year, the AGM held on April 12 at the Bangkok Convention Center, 5th floor, Central Plaza Lardprao Shopping Complex, 1695 Phaholyothin Road, Chatuchak District, Bangkok. No extraordinary meeting was held this year.

1.2 Delivering Meeting Notices

For this year's AGM, Board Meeting No. 2/2561 (2018) of February 20, 2018, decided to call a meeting on April 12, 2018. Its decision, meeting date, and meeting agenda were disclosed in detail ahead of time by announcing on SET's website to alert 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, the annual 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 22, 2018, and three days before the meeting, the invitation was announced through one Thai and one English newspaper, each for three consecutive days (April 6 - 8, 2018), 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 (<http://www.pttplc.com>) 30 days before the meeting date (starting March 12, 2018).

1.3 On the Meeting Date

Before the meeting, the Chairman of the meeting introduced the directors, the management, the external auditor, and the legal adviser who served as a neutral party. The Chairman then elaborated on the voting and vote counting for individual agenda items under PTT's Articles of Association, as well as how to vote on each agenda item. Once information had been provided on each item, the Chairman gave the floor to all attendees to give comments or recommendations and ask questions, giving adequate time for debate. The Chairman and the 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, except there are at least two-third of the votes of shareholders in attendance. Alternatively, the shareholders with at least one-third of all sold shares may ask the meeting to consider other matters not mentioned in the meeting notice. At the 2018 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 2018 AGM began at 2.00 p.m., with registration beginning at 12 noon. At the meeting's opening, a total of 4,831 shareholders registered, of whom 1,964 were shareholders and 2,867 were proxy holders, holding a total of 2,279,542,475 shares, or 79.81% of the total shares, which exceeded one-third of all PTT's sold shares of 2,856,299,625, with the following attendees:

Board of Directors

1. Mr. Piyasvasti Amranand	Chairman/ Independent Director
2. Prof. Dr. Kittipong Kittayarak	Independent Director/ Chairman of the Audit Committee
3. AM Boonsuib Prasit	Independent Director/ Chairman of the Nominating Committee
4. Gen. Chatchalerm Chalermsook	Independent Director/ Chairman of the Corporate Governance Committee
5. Mr. Vichai Assarasakorn	Independent Director/ Chairman of the Remuneration Committee/ Member of the Audit Committee
6. Mr. Chanvit Amatamatucharti	Independent Director/ Member of the Nominating Committee/ Chairman of the Enterprise Risk Management Committee
7. Ms. Nuntawan Sakuntanaga	Independent Director/ Member of the Audit Committee
8. Mr. Thon Thamrongnawasawat	Independent Director/ Member of the Nominating Committee/ Member of the Corporate Governance Committee
9. Mr. Supot Teachavorasinskun	Independent Director
10. Mr. Somsak Chotrattanasiri	Independent Director/ Member of the Remuneration Committee
11. Mr. Don Wasantapruek	Independent Director/ Member of the Corporate Governance Committee
12. Mr. Somkit Lertpaithoon	Independent Director/ Member of the Enterprise Risk Management Committee
13. Mr. Thammayot Srichuai	Director/ Member of the Enterprise Risk Management Committee
14. Mr. Tevin Vongvanich	Director and Secretary to the Board/ President & CEO

Mr. Somchai Sujjapongse, director, absence due to overseas trips and official engagement.

Executives

1. Mr. Wirat Uanarumit	Chief Operating Officer, Upstream Petroleum & Gas Business Group
2. Mr. Auttapol Rerkpiboon	Chief Operating Officer, Downstream Petroleum Business Group, and Acting Senior Executive Vice President, Downstream Business Group Alignment
3. Mrs. Nitima Thepvanangkul	Chief Financial Officer
4. Mr. Chansin Treenuchagron	Chief Technology and Engineering Officer, who was appointed by the Board to President and CEO with effect from August 31, 2018.

Also in attendance were senior executive vice presidents, executive vice presidents, and executives from PTT Group at the front of the stage, ready to address queries and provide information for relevant questions. Independent directors also served as proxies for minor shareholders.

External Auditors

1. Ms. Mayuree Chanthamat	State Audit Office of the Kingdom of Thailand
2. Ms. Phakawan Sueblao	State Audit Office of the Kingdom of Thailand
3. Ms. Jirawat Pruksasuy	State Audit Office of the Kingdom of Thailand

Legal Advisers (to proctor balloting in case of disputes during the meeting)

1. Mrs. Veeranuch Thammavaranucupt	Weerawong, Chinnavat & Partners Ltd.
2. Mr. Panuwat Chalongkumdee	Weerawong, Chinnavat & Partners Ltd.
3. Ms. Thitawan Thanasombatpaisarn	Weerawong, Chinnavat & Partners Ltd.
4. Mr. Anurag Ramanat	Anurag Ramanat International Legal Counsellor Ltd.
5. Ms. Natthita Thanikkul	Anurag Ramanat International Legal Counsellor Ltd.

Number of shareholders (at the meeting's conclusion at 05.30 p.m.)

A total of 5,294 shareholders registered, of whom 2,240 were shareholders and 3,054 were proxy holders, commanding a total of 2,345,908,068 shares or 82.13% of the total sold shares.

1.4 Practical Guidelines for Reporting Conflicts of Interest

As specified by PTT CG Handbook, all directors, the 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 connected matter.

At the shareholders' meetings, any director with vested interests or involvement on any agenda item must inform the meeting to excuse themselves and abstain from voting on each applicable agenda item.

1.5 Disclosure of Shareholders' Meeting Outcomes

For the 2018 AGM, PTT submitted a summary of AGM resolutions to SET and SEC at the end of the day after the meeting (April 12, 2018). It also submitted the minutes of the shareholders' meeting (each agenda clearly separated indicated 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 after the meeting. Meeting information, video-recording, photos, and audio-recording are accessible through PTT's website.

2. Equitable Treatment of Shareholders

PTT treats all shareholders fairly despite 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. At the AGM, seats at the most convenient spots were reserved for the elderly, the handicapped, and pregnant women, with officers attending to their needs. Information on the shareholders' meeting was announced ahead of the meeting in Thai and English. Directors with vested interests in any agenda item must excuse themselves from the meeting on that item. All shareholders have equal rights to take part in PTT's activities.

2.1 Proposing Additional Meeting Agenda Items and Nominating Directors

To enable minor shareholders to take part in business operations and auditing, for the 2018 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, the shareholders, and the stakeholders. In practice, shareholders with a combined holding of at least 5% of the total eligible votes or at least 100,000 shares held uninterrupted for at least one year could propose agenda items or nominate directors before the AGM from September to November of the previous year, in case the nomination of directors might need the approval of the State Enterprise Policy Office (SEPO), as required by the regulation of The Prime Minister's Office on State Enterprise Policy and Monitoring B.E. 2557 (2014).

For this year's AGM, PTT posted such criteria on its website and an announcement on SET's website from September 1, 2017, to November 30, 2017. However, this attracted no recommendation of such agenda items or nomination of directors, and the Corporate Secretary duly informed the Board meeting on the matter.

2.2 Facilitating Shareholders at the Meeting

As in previous AGM meetings, at the 2018 AGM, PTT facilitated all shareholders by manning officers to welcome and take care of them, and provided adequate convenience. The meeting venue was well chosen to accommodate all shareholders and facilitate the elderly and those on wheelchairs. Back-up meeting rooms were arranged, as was a signal relay system between meeting rooms. Security precautions and emergency contingency plans were in hand. Examination of registration credentials seven days ahead of the meeting was possible. Officers provided photocopying services and verified documents. On the meeting day, registration opened two hours early and extended until the period before the last meeting agenda. A barcode system quickened registration and voting. Finally, the shareholders had access to a reception and snacks.

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 meetings, PTT arranges for suitable communication and provides translation into Thai for both queries and answers for the benefit of other shareholders to preserve their interests and ease communication needs for foreign shareholders.

2.3 Appointing Proxies

To maintain the rights of those who could not attend the 2018 AGM in person, they could appoint proxies or delegate their votes to any independent director in attendance on behalf of shareholders without conditions. PTT treats proxies as if they were shareholders. As a rule, 30 days ahead of each meeting, PTT discloses the proxy form, attached along 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. The following spells out PTT Group's missions for each group:

The country:	Ensuring long-term energy security by providing adequate high-quality energy supply at fair prices to support economic growth.
Communities and society:	Representing a corporate citizen by exercising environment stewardship of international standards and improving the quality of life for communities and society.
Shareholders:	Operating profitable businesses that lead to sustainable growth while generating optimal returns.
Customers:	Ensuring customers' satisfaction and loyalty by delivering world-class quality products and services at fair prices.
Business partners:	Conduct fair practices with all partners while promoting trust, relationship, and cooperation to extend business capability and increase efficiency in long-term business partnerships.
Employees:	Promoting professional capability-building and ensuring that employees' wellbeing is on a par with those in other leading companies in order to strengthen employee engagement.

3.1 Treatment of Six Main Stakeholder Groups

3.1.1 Thailand

As the national energy entity with a crucial mission to drive the country under the national strategies and the "Secure, Prosperous, and Sustainable" Thailand vision, PTT is tasked with a mission to achieve long-term energy security through procurement of energy supplies of sufficient volumes, standard quality, and at fair prices to promote economic growth.

PTT's operating directions and strategies in line with the Thailand 4.0 national strategy, Ministry of Energy policy, and state enterprise strategies have resulted in the following roles.

1) Energy Security: PTT leverages its investment budget to relentlessly develop energy infrastructure to accommodate rising energy consumption, including natural gas transmission systems, LNG-receiving terminals, LPG import facilities, oil terminals, service stations, and the battery and power businesses. In sourcing energy supplies to meet domestic demand, PTT executes risk management plans for those from various sources of supply to ensure adequate volumes, quality, and standards, including sourcing of domestic natural gas imports LNG (Liquefied Natural Gas) from neighboring countries.

2) Economy: PTT procures energy at suitable prices for business competitiveness; energy efficiency improvement; and value added to petroleum through gas separation plants (GSPs), oil refineries, and the petrochemical business. These have created continuous businesses development and promoted the application of technologies to improve efficiency and develop the caliber of operators throughout the business chains—all designed to strengthen and grow the digital economy. In addition, PTT is a key alliance of the public sector in driving the Thailand 4.0 Policy by jointly developing infrastructure and a platform for research and innovation to support Eastern Economic Corridor of Innovation (EECI).

3) Sustainability: PTT applied the inclusive business concept to the development of the community enterprise project, which creates value for agricultural produce of communities, with marketing channels for product distribution. Besides, PTT supported disabled person in the "Amazon for Chance" project and cooperated with the public sector in other Pracharath projects, such as safe driving. For environmental stewardship, PTT is committed to creating security, safety, health, and a sound environment in all operating areas and to supporting investment in R&D of green energy, green products and services, including the value-chain operations that align with sustainable development goals (SDGs). Moreover, PTT joined forces with other companies in PTT Group and set targets and operating actions to lessen greenhouse gas (GHG) emissions to halt global warming.

3.1.2 Society and Communities

PTT is committed to supporting sustainable growth for the Thai society (“Sustainable Growth for All”) by adhering to SDGs of the United Nations as guidelines for social development endeavor. Mainly, the focus is on **people development (People)** so that they may possess sufficient skills to live in the 21st century through promoting innovative learning in and outside classrooms and developing their skills so as to upgrade their quality of living to self-reliance. In addition, PTT supported the conservation and **restoration of natural resources and environment (Planet)** by raising the awareness of and cooperation in the conservation of nature and the ecosystem and form networking in environmental restoration, on land and offshore. This included the continual reforestation of 1 million rai for rich forest and reduction of impacts from climate change.

Details about these sustainable efforts are illustrated under “Extending the energy mission, inspiration for sustainability” in the 2018 Annual Report and the 2018 Corporate Sustainability Report.

3.1.3 Shareholders

The Sustainable Growth Strategy applied in PTT management to achieve a high-performance organization (HPO) based on Corporate Governance (CG) in tandem with Corporate Social Responsibility (CSR) to ensure investors that PTT provides sound investment returns and is sustainable, apart from being a part of Thai society in the future.

Investors' Activities

Since 2006, PTT has arranged ongoing trips for minor investors to visit its operation, update information, and meet the management as well as participating in PTT's CSR activities in Rayong.

In 2018, PTT organized these activities on October 30 - 31, by mailing letters of invitation and response forms to all shareholders whose names appeared on the share roster on the date of closing of its registration to suspend share transfer for the 2018 AGM attendance (March 7, 2018). Interested shareholders were asked to notify PTT of their interest in the visit. But due to the overwhelming interest shown by shareholders (about 2,266 persons), PTT had to draw lots to select those who won the right to visit, as done in past years. Witnessing the draw on September 18 were the Corporate Governance Committee, executives and CG taskforce members. The winners' names were posted on PTT's website. PTT notified the winners by phone to confirm their acceptance. This activity involved 300 shareholders' visits (two groups of 150 persons each) to the Kamnoetvidya Science Academy (KVIS), Vidyasirimedhi Institute of Science and Technology (VISTEC), and Wang Chan Forest Learning Center, Amphoe Wang Chan, Rayong, to hear a presentation about their operations. PTT will apply shareholders' recommendations to the improvement of its work next year.

Those interested in visiting PTT's sites can follow project updates and details on PTT's website. PTT reserves the rights to invite only those that have never taken part in this activity.

Activities for Debenture Holders

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. In 2018, the activities were diverse to meet the needs of debenture holders, who numbered over 22,500, including:

- The “happiness” quarterly journal, which communicates corporate data, provides energy knowledge, and interesting articles in an edutainment way
- Three visits to PTT's business operation. The first was a trip to VISTEC, KVIS, and the Wang Chan Forest Project in Rayong in March, the second to Amazon Inspiring Campus (AICA) and the Oil Business Academy (OBA) in July, and the third to the Rayong GSP in October.