

1. Policy and Business Operations Overview

1.1 Vision, Mission, Objective and Strategy

PTTEP is Thailand's leading E&P Company with the mission to sustainably explore, secure energy resources and produce domestically and around the globe, while generating satisfactory return to our shareholders and stakeholders. The Company has a new strategy "Expand and Execute" in order to enhance the company's competitive advantage and maintain sustainable growth. The Company's mission and vision are shown below:

Vision: Energy Partner of Choice through Competitive Performance and Innovation for Long-term Value Creation

Mission: PTTEP operates globally to provide reliable energy supply and sustainable value to all stakeholders.

Goal and Objective: The Company's objective is to create a balance between strong performance and business sustainability, with the aim of maintaining and achieving the following long term goals:

- Unit cost in the top quartile among peers
- Proved reserves to production ratio (R/P Ratio) of more than 7 years
- Average production growth of 5% (CAGR) till year 2030

Strategy: To attain the above, PTTEP have formulated 2 strategies: (1) Expand and (2) Execute as follows:

(1) **Expand: Strategy to focus growth in strategic investment areas and diversify into energy related businesses for long-term sustainability**

- **Coming-Home Strategy:** PTTEP focuses investments in Thailand and South East Asia where the Company targets as strategic investment areas. Moreover, PTTEP also looks to expand business opportunities such as pursuing Gas Value Chain business in Myanmar in the form of Gas to Power.
- **Strategic Alliance Strategy:** PTTEP aims to capture investment opportunity in other petroleum prolific areas with strategic alliances by mainly focusing on the Middle East.
- **Sustainable Development Strategy:** PTTEP plans to invest in businesses focusing on technology and innovation as well as R&D capability to support core E&P business and future investment opportunity related to the energy industry.

(2) **Execute: Strategy to increase sales volume of legacy assets and maintain competitive advantage**

- Create full value from existing assets with the emphasis on increasing production from key assets
- Maintain cost competitiveness through digital and organizational transformation
- Accelerate key development projects such as the Mozambique Rovuma Offshore Area 1 project and Hassi Bir Rakaiz project by closely monitoring their statuses and providing any necessary support
- Effectively execute the transitions for Bongkot, Erawan and newly acquired assets

Procedure to Set the Company's Vision and Mission

PTTEP Board of Directors (Board) reviews and approves the vision and mission of the Company annually, being accompanied generally by the management, through a systematic planning process. The process is started by updating the current business environment and the E&P industry trend, and their implications on the Company regarding opportunities and risks. In addition, the Company's investment portfolio is reviewed and assessed on returns and risks to identify the vision, mission, and short-term and long-term strategic directions. These allow the Company to achieve sustainable growth as well as be able to cope with business changes. The management will then develop the Company's work plan, budget, and Key Performance Indicators (KPIs), based on the given strategic directions and policies, to be presented to the Board for approval prior to implementation.

After the Board approves the vision, mission, and corporate strategy, the management will cascade down the approved strategic directions and corporate targets to promote a better understanding among all of the Company's employees. In principle, this will subsequently lead to sub-work plan development and implementation which are in line with the corporate target, work plan, and core values to achieve the Company's goals at the end. However, the Board also regularly supervises and monitors management's implementation of stated strategic plans in accordance with business directions and strategies. The management is responsible for reporting its performance in comparison to the strategic plans to the Board of Directors for acknowledgement on a quarterly basis.

1.2 PTTEP Sustainability Management

1.2.1 Sustainability Management Overview

PTTEP's Sustainability Management is an integration of environmental and social responsibility into our business decisions to meet the expectations of our stakeholders, investors, shareholders, business partners, host governments, various communities, and employees. We continuously emphasize effective management of the three pillars of sustainability to reflect all ongoing concerns regarding any environmental and social issues as well as to create value for the Company and our stakeholders. Sustainability targets and strategies, and their implementation are driven by efficient business processes, funding, Governance, Risk and Compliance (GRC) management, innovation and technology, cost reduction, and human capability development to enhance production and to achieve work efficiency. To accomplish this, we have adopted His Majesty the late King Bhumibol Adulyadej's (Rama IX) Sufficiency Economy Philosophy (SEP) as the guideline for our business operations and have aligned our sustainability management with the United Nations Sustainable Development Goals (UN SDGs), focusing on Goals 7, 8, 12, 13 and 14, while continuing our support for the rest of the SDGs in our routine operations. Further, we use the Dow Jones Sustainability Indices (DJSI) to measure our sustainability performance at the international level.

In 2019, PTTEP was selected as a DJSI member in the World Oil and Gas Upstream & Integrated Industry for the sixth consecutive year and also named the Industry Leader in this category for the second time since the first one received in 2016. In addition, we were chosen as a member of the FTSE4Good Index Series for the fourth consecutive year. Additionally, in 2019, we received the SET Awards 2019 in Best Sustainability Awards from the Stock Exchange of Thailand (SET).

1.2.2 Materiality Assessment

PTTEP's materiality assessment process engages both internal and external stakeholders by using international standards, such as the Global Reporting Initiative (GRI Standards) Sustainability Reporting Guideline: Oil and Gas Sector Disclosures (OGSD) framework – core level, IPIECA's Oil and Gas Industry Guidance on Voluntary Sustainability, Dow Jones Sustainability Indices (DJSI), AA1000 AccountAbility Principles Standard (2008) (AA1000APS), and SASB Materiality Map™ by Sustainability Standards Board (SASB). This includes a thorough review of the current and future business risks and opportunities in the business, social and environmental dimensions, so as to identify and prioritize the Company's material sustainability issues which are significant issues to our business and stakeholders. Additionally, the Materiality issues are used as key inputs for the development of PTTEP Sustainability Strategy and long-term targets, which are publicly disclosed in our Sustainability Report.

In 2019, eight material sustainability issues of importance were identified and prioritized from the process of engaging with our stakeholders and top management through the standard materiality assessment process. The eight issues are listed below:

Business Dimension

- GRC – Governance, Risk Management and Compliance
- Increasing Petroleum Reserves
- Human Resource Preparation
- Technology and Innovation
- Occupational Health and Safety

Social Dimension

- Contribution to Community and Society

Environmental Dimension

- Lower Carbon Future
- Environmental Management

The Company's assessment process for identifying the material sustainability issues for 2019 included a structured and systematic review of the issues with significant business, environmental and social impacts on the Company as well as those issues which are important to our internal and external stakeholders. The assessment was conducted by identifying and assessing the material issues from the Company's and the stakeholder's perspectives, defining reporting boundaries, and prioritizing the issues from their levels of significance, using agreed criteria and stakeholder engagement. The result was subsequently submitted to the Management Committee and the Board of Directors for content review and approval. Additional details can be found at:

<https://www.pttep.com/en/Sustainabledevelopment/Disclosure/Approachtoreporting.aspx>.

1.2.3 Environmental and Social Contribution

According to PTTEP's sustainable development policy, the Company continuously implements the environmental and social programs. New and ongoing key environmental projects in 2019 are the flash & flare gas recovery and utilization, methane (CH₄) survey and leak reduction (in process), replacement of the membrane to improve the removal of the CO₂ content from natural gas, energy efficiency improvement through the optimization of the heat recovery steam generators, seawater cooling water pumps, and the logistics fleet management projects. In 2019, these projects totally contributed to the reduction of greenhouse gas emissions of 256,498 tonnes carbon dioxide equivalent (CO₂e) per year, while generating revenue and saving costs of approximately THB 676.543 million from hydrocarbon recovery and energy efficiency improvement.

We also carry out other programs which create socio-economic value such as the Crab Hatchery Learning Center Project, which was established in 2013 and was a joint initiative between PTTEP and the community in Hua Khao Sub-district, Songkhla Province, in collaboration with the National Institute of Coastal Aquaculture (NICA) and the network of local fishermen. The project objective is to develop knowledge on crab hatching techniques, which consequently help to replenish marine resources, safeguard the livelihoods of local fishermen and promote sustainable fishery practices. Since then, the project has been replicated in other areas and there were four learning centers by the end of December 2019, leading to the establishment of 33 conservation networks and 25 marine conservation zones covering an area of 18 square kilometers. The Crab Hatchery Learning Center is one of our social development initiatives that demonstrates the Company's intention to combine our expertise with local wisdom to solve problems and to strengthen local communities in a sustainable way. We believe that this effort will lead to social license to operate for our business, prevent potential significant impacts on the environment and communities, and indirectly reduce our operating costs.

1.3 Development and Significant Changes in 2019

Since 2019, PTTEP has operated through the strategies, “Expand” and “Execute”, to create and achieve sustainable growth. The Company has succeeded in expanding its investment in strategic areas based on the “Expand” strategy with the focus in Southeast Asia (“Coming Home” Strategy) and the Middle East with strategic partners (“Strategic Alliance”). For “Execute”, which is the strategy to achieve competitive performance through efficiency and adoption of new technology and to maintain the production plateau, as well as to ensure smooth operational transitions of recently acquired assets i.e. the exploration blocks in the Gulf of Thailand, G1/61 Project (Erawan Field) and G2/61 Project (Bongkot Field), assets in Malaysia and under Partex. Moreover, PTTEP has continued to accelerate the Final Investment Decision (FID) of the Pre-Development projects and to accelerate exploration activities of projects for long-term reserves addition. The following are the highlights of these developments and changes by region.

Thailand

In February 2019, the Company signed the Share Purchase Agreement (“SPA”) to acquire 33.8% stake in APICO LLC, a joint venture of Sinphuhorm Project from Tatex Thailand LLC and Tatex Thailand II LLC. After the completion of the transaction, PTTEP’s stake (both direct and indirect) in this project increased to 66.8%.

In February 2019, the Company, together with MP G2 (Thailand) Limited, a subsidiary of Mubadala Petroleum (Thailand) Holdings Limited, signed the Production Sharing Contract (PSC) in G1/61 (Erawan Field) with the holding interest of 60% and 40% respectively. For G2/61 (Bongkot Field), the Company signed the PSC with the holding interest of 100%. PTTEP is also the operator of both fields. Under the PSCs, the minimum production volume of Erawan and Bongkot fields are committed at 800 and 700 MMSCFD respectively while production will start from 2022-2023.

In July 2019, the Company entered into the Share Purchase Agreement (“SPA”) to acquire additional 39% stake in APICO LLC from Coastal Energy Company (Khorat) Limited. After the completion of the transaction, PTTEP’s stake in this project increased from 66.80% to 80.48%.

Other South East Asia

In March 2019, the Company signed a Share Sale and Purchase Agreement (“SSPA”) to acquire the 100% of Murphy Oil Corporation’s (“Murphy”) business in Malaysia through the equity in two subsidiaries of Murphy; Murphy Sarawak Oil Company Limited (“Murphy Sarawak”) and Murphy Sabah Oil Company Limited (“Murphy Sabah”). These two companies held 5 projects: 2 producing, 1 development and 2 exploration projects, including the SK309 & SK311 Project, the Sabah K Project, the Sabah H Project, the SK314A Project and the SK405B Project. The acquisition was completed in July 2019 and resulted in incremental petroleum sales volume to PTTEP is approximately 48,000 barrels of oil equivalent per day (BOED) and ramping up to 60,000-70,000 BOED in 2022.

In March 2019, the Company and PETRONAS Carigali Sdn. Bhd. (PCSB) signed Production Sharing Contracts with Petroliaam Nasional Berhad (PETRONAS) for exploration and production rights of 2 blocks located in offshore Peninsular Malaysia. One is PM407, which PTTEP holds 55% participation interests and PCSB holds 45% participation interests. The other is PM415, which PTTEP holds 70% participation interests and PCSB holds 30% participation interests.

In June 2019, the Company made a discovery of gas at the Lang Lebah-1RDR2, the first exploration well in Sarawak SK410B Project located in offshore Sarawak, Malaysia. The wells encountered 252 meters of net gas pay, indicating multi-TCF gas discovery. The consortium consists of PTTEP HKO (the Operator), KUFPEC and PETRONAS Carigali Sdn. Bhd. with participating interests of 42.5%, 42.5% and 15% respectively.

In September 2019, Myanmar M11 Project submitted a request to relinquish the exploration block after the fulfillment of the requirements under the Production Sharing Contract, with no commercial discovery. The request is awaiting approval from the government.

Middle East

In January 2019, the Company and Eni Abu Dhabi B.V., a wholly-owned subsidiary of Eni were selected as the successful bidders from the Abu Dhabi's Open Block Licensing Round for exploration and production rights of two offshore blocks named Offshore 1 and Offshore 2 which are located in the north-west of Abu Dhabi, the United Arab Emirates. The consortium consists of PTTEP MENA Limited and Eni Abu Dhabi B.V. (the Operator) with participating interests of 30% and 70% respectively.

In June 2019, the Company signed a Share Purchase Agreement ("SPA") to acquire a 100% stake in Partex Holding B.V. (Partex) from Calouste Gulbenkian Foundation. Partex held 7 projects, primarily as a non-operating partner, in 5 countries with the focus areas in the Sultanate of Oman (Oman) and the United Arab Emirates (UAE) including The PDO (Block 6) Project, The Mukhaizna (Block 53) Project, Oman LNG Project (OLNG) and ADNOC Gas Processing Project (AGP). The acquisition was completed in November 2019. As a result, the incremental petroleum sales volume to PTTEP is approximately 16,000 barrels of oil equivalent per day (BOED).

Africa

In March 2019, the Company, together with SONATRACH (Algeria's National Oil and Gas Company) and CNOOC Limited, has started development on Phase 1 of Algeria Hassi Bir Rekaiz Project in Algeria, following the conclusion with partners and its approved development plan by ALNAFT (Agence Nationale pour la Valorisation des Ressources en Hydrocarbures – Regulating body of Hydrocarbon Exploration & Production). The development activities have been commenced in March 2019. The first oil production for the initial phase of 10,000-13,000 barrels per day (BPD) is expected in early 2021 with a plan for the second phase production capacity ramping up to around 50,000-60,000 BPD in 2025. PTTEP holds 24.5% participation interest and the other joint venture partners consist of SONATRACH and CNOOC Limited hold participation interest of 51% and 24.5%, respectively.

In June 2019, the Company, with 8.5 percent of participating interest in Mozambique Area 1 Project and its partners announced the Final Investment Decision (FID) of the project on the initial two onshore liquefaction trains. This official declaration of FID signifies that the project will advance to the construction phase to develop the Golfinho-Atum natural gas accumulations located in offshore Area 1 with the onshore LNG facility of the first two liquefaction trains, a total nameplate capacity of 12.88 million tons per annum (MTPA). The project has successfully secured the long-term LNG sales of 11.1 MTPA, representing more than 80% of the plant's capacity. Designated as "First Mover" by the Government of Mozambique, the Mozambique Area 1 Project will also be responsible for the construction of the support facilities to be shared with Area 4 Project. In addition, the project holds substantial recoverable natural gas resources of approximately 75 trillion cubic feet (TCF) and potentially on the path to become one of the world's largest emerging LNG supply hubs. This project will add, to PTTEP's portfolio, the total estimated proved reserves (1P) of approximately 140 million barrels of oil equivalent (MMBOE), according to working interest and is expected to deliver 1st Cargo by 2024.

Australasia

In March 2019, the Company reported the successful drilling results of the exploration well, Orchid-1 in Permit AC/P54 and encountered gas and condensate with the net pay thickness around 34 metres. The well result will be incorporated in development planning of Cash-Maple field, with total of 3.5 TCF resources.

1.4 Shareholding Structure of PTTEP Group

1.4.1 Business Overview

PTTEP's core business is exploration and production of petroleum in Thailand and foreign countries. As of December 31, 2019, PTTEP Group had petroleum exploration and production projects in 15 countries with details as follows:

No.	Project Name	Phase	Location	Participation Interest	Operator
Thailand					
1	Bongkot Project	Production	Gulf of Thailand	66.6667%	PTTEP
2	S1 Project	Production	Upper Central	100%	PTTEP
3	PTTEP 1 Project	Production	Central	100%	PTTEP
4	B6/27 Project	Production	Gulf of Thailand	100%	PTTEP
5	Arthit Project	Production	Gulf of Thailand	80%	PTTEP
6	L22/43 Project	Production	Upper Central	100%	PTTEP
7	L53/43 & L54/43 Project	Production	Central	100%	PTTEP
8	E5 Project	Production	North East	20%	ExxonMobil
9	Contract 3 Project	Production	Gulf of Thailand	5%	Chevron
10	Contract 4 Project	Production	Gulf of Thailand	60%	Chevron
11	G4/43 Project	Production	Gulf of Thailand	21.375%	Chevron
12	Sinphuhorm Project	Production	North East	55% ¹	PTTEP
13	B8/32 & 9A Project	Production	Gulf of Thailand	25.001%	Chevron
14	G4/48 Project	Production	Gulf of Thailand	5%	Chevron
15	G1/61 Project	Exploration	Gulf of Thailand	60% ²	PTTEP
16	G2/61 Project	Exploration	Gulf of Thailand	100% ²	PTTEP
Overlapping Area					
1	MTJDA Project	Production	Thailand-Malaysia	50%	CPOC
2	G9/43 Project	Exploration	Thailand-Cambodia	100%	PTTEP
Overseas					
Myanmar					
1	Zawtika Project	Production	Gulf of Moattama	80%	PTTEP
2	Yadana Project	Production	Gulf of Moattama	25.5%	Total

¹ PTTEP holds directly and indirectly 80.48% participating interest in Sinphuhorm Project after the acquisition of 33.8% and 39% stakes in APICO from Tatex and Coastal Energy in 2019, respectively. APICO has 35% participating interest in Sinphuhorm Project.

² PTTEP was awarded the rights of petroleum exploration and production for Block G1/61 and G2/61 in December 2018 and signed the Production Sharing Contracts on February 25, 2019.

No.	Project Name	Phase	Location	Participation Interest	Operator
3	Yetagun Project	Production	Gulf of Moattama	19.31784%	Petronas
4	Myanmar M3 Project	Exploration	Gulf of Moattama	80%	PTTEP
5	Myanmar M11 Project ³	Exploration	Gulf of Moattama	100%	PTTEP
6	Myanmar MD-7 Project	Exploration	Andaman Sea	50%	PTTEP
7	Myanmar MOGE 3 Project	Exploration	Onshore	77.5% ⁴	PTTEP
Malaysia					
1	Malaysia Project ⁵	Exploration/ Development/ Production	Offshore	6.4-80% ⁶	PTTEP ⁶
Vietnam					
1	Vietnam 9-2 Project	Production	Offshore	25%	HV JOC
2	Vietnam 16-1 Project	Production	Offshore	28.5%	HL JOC
3	Vietnam B & 48/95 Project	Exploration	Offshore	8.5%	Petrovietnam
4	Vietnam 52/97 Project	Exploration	Offshore	7%	Petrovietnam
Indonesia					
1	Natuna Sea A Project	Production	Offshore	11.5%	Premier Oil
Kazakhstan					
1	Dunga Project ⁷	Production	Onshore	20%	Total
Oman					
1	PDO (Block 6) Project ⁷	Production	Onshore	2%	Petroleum Development Oman
2	Mukhaizna (Block 53) Project ⁷	Production	Onshore	1%	Occidental Petroleum

³ On September 26, 2019, PTTEP submitted a request to terminate and return the exploration block of Myanmar M11 Project after fulfillment of the requirements of the Production Sharing Contract. The termination will be effective after receiving the official approval from the Government of the Republic of the Union of Myanmar.

⁴ On February 28, 2019, PTTEP received the approval from the Government of the Republic of the Union of Myanmar to receive the transfer of the participating interest in MOGE 3 Project from other partners. As a result, PTTEP's participating interests increased from 75% to 77.5% and PTTEP is the operator of the project.

⁵ On March 21, 2019, PTTEP signed the Share Sale and Purchase Agreement to acquire 100% of Murphy Oil Corporation's business in Malaysia, the conditions precedent to closing prescribed in the agreement was completed in July 2019. Subsequently, PTTEP has named investments of all projects in Malaysia under 'Malaysia Project'.

⁶ Malaysia Project holds many petroleum blocks where PTTEP as Operator has various participation interest from 42-80%, except one area named Gumusut-Kakap (GK) in Sabah K Block where PTTEP is a joint venture partner with participation interest of 6.4%, and Shell is the Operator.

⁷ On June 17, 2019, PTTEP signed the Share Purchase Agreement to acquire a 100% stake in Partex Holding B.V. from Calouste Gulbenkian Foundation, the conditions to closing prescribed in the agreement was completed in November 2019.

No.	Project Name	Phase	Location	Participation Interest	Operator
United Arab Emirates					
1	Abu Dhabi Offshore 1 Project ⁸	Exploration	Offshore	30%	Eni Abu Dhabi B.V.
2	Abu Dhabi Offshore 2 Project ⁸	Exploration	Offshore	30%	Eni Abu Dhabi B.V.
Algeria					
1	Algeria 433a & 416b Project	Production	Onshore	35%	GBRS
2	Algeria Hassi Bir Rekaiz Project	Development	Onshore	24.5%	PTTEP
Mozambique					
1	Mozambique Area 1 Project	Development	Offshore	8.5%	Total ⁹
Angola					
1	Block 17/06 Project ⁷	Exploration	Offshore	2.5%	Total
Australia					
1	PTTEP Australasia Project	Exploration	Offshore	90 - 100% ¹⁰	PTTEP
Canada					
1	Mariana Oil Sands Project	Exploration	Onshore	100%	PTTEP
Brazil					
1	Potiguar Project ⁷	Production	Onshore	50%	PTTEP
2	Barreirinhas AP1 Project	Exploration	Offshore	25%	Shell Brasil
3	Brazil BM-ES-23 Project	Exploration	Offshore	20%	Petrobras
Mexico					
1	Mexico block 12 (2.4) Project	Exploration	Offshore	20%	PC Carigali Mexico
2	Mexico block 29 (2.4) Project	Exploration	Offshore	16.67%	Repsol Exploración México

Principal Projects in Operation

The following is a summary of project activities undertaken during 2019. Production and sales figures described hereunder are total production and sales figures for the respective projects.

(1) Project Activity Highlights in Thailand

⁸ PTTEP was selected as the successful bidders for the exploration and production rights of two offshore blocks in United Arab Emirates, named Offshore 1 and Offshore 2 and signed the Concession Agreement with Abu Dhabi National Oil Company on January 12, 2019.

⁹ On September 30, 2019, the acquisition transaction between Anardarko Petroleum Corporation and Occidental Petroleum Corporation was completed, together with the acquisition of African assets between Occidental Petroleum Corporation and Total. Total has officially become the operator of Mozambique Area 1 Project.

¹⁰ PTTEP Australasia Project holds many petroleum blocks which have varying participation interests ranging from 90 - 100%.

Most PTTEP projects in Thailand are in the production phase, located both in the Gulf of Thailand and onshore. The following are highlights of key project activities in Thailand during 2019.

Bongkot Project

The Bongkot Project is located in the southern part of the Gulf of Thailand, consisting of Bongkot North and Bongkot South fields (Blocks B15, B16 and B17). The Company currently holds 66.6667% interest after the completion of additional stake of 22.2222 in Blocks B15, B16 and B17 from Shell Integrated Gas Thailand Pte. Limited (Shell) and Block G12/48 from Thai Energy Company Limited (a wholly-owned subsidiary of Shell) on June 21, 2018. The Company is the operator. The project has been in production since 1993. All of the natural gas and condensate produced from the Bongkot Field are sold to PTT, under a Take-or-Pay basis pursuant to long-term Gas Sales Agreements (GSA).

During the year 2019, the project continuously drilled production wells to maintain production volumes as planned. The Block G12/48, located adjacent to the east of Bongkot South Field and operated by the Company with 66.6667% working interest, was approved the production area and development plan by the Department of Mineral Fuels, Thailand, in March 2015, and started production in October 20, 2018 through Bongkot South Field's Central Processing platform with the natural gas being sold to PTT under the field's sales contract. Overall, the average sales volume of the project in year 2019 was 810 million standard cubic feet per day (MMSCFD) for natural gas (equivalent to approximately 131,200 barrels of oil equivalent per day (BOED)) and approximately 22,800 barrels per day (BPD) of condensates.

On December 13, 2018, as announced in the bidding result of the expiring concessions in 2022-2023 in the Gulf of Thailand, the Company was solely awarded the rights of petroleum exploration and production and as the operator of Block G2/61 (Bongkot field, consisting of Blocks B15, B16 and B17). Currently, the project is in the transition process to ensure production continuity starting in 2022 until the Production Sharing Contract ends. More information is provided in the G2/61 project.

S1 Project

The S1 Project is the largest onshore oil field in Thailand, with an area covering parts of Kamphaeng Phet, Sukhothai, Phitsanulok, Phichit and Uttaradit provinces. PTTEP is the sole owner and operator. Products from the S1 Project consist of crude oil, natural gas, and liquefied petroleum gas (LPG). Crude oil produced at S1 is sold to PTT which is transported via truck and rail to the refineries of Thai Oil Public Company Limited, Bangchak Corporation Public Company Limited (Bangchak) refineries, PTT Global Chemical Public Company Limited, and IRPC Public Company Limited. The produced gas from the project and the other part that goes to a gas plant to separate LPG with both be sold to PTT.

During the year 2019, the project continuously drilled additional production wells with exploration drilling plan in 2019 to maintain its production level. Environmental impact assessments were also undertaken in both existing and new production areas. The project's average crude oil sales volume for the year was approximately 31,000 BPD, while sales volume of natural gas averaged 10 MMSCFD (approximately 1,900 BOED), and average LPG sales volume was 200 metric tons per day (approximately 1,700 BOED).

PTTEP 1 Project

The PTTEP 1 Project is located in Suphan Buri and Nakhon Pathom provinces. PTTEP is the sole owner and operator. Crude oil produced at the project is sold to PTT and is transported via truck to the Bangchak refinery. During the year 2019, the average sales volume of the project for crude oil was approximately 230 BPD.

B6/27 Project

The B6/27 Project is located in the Gulf of Thailand, off the coast of Chumphon Province. PTTEP is the sole owner and operator. Currently, the project is in the process of decommissioning as it is towards the end of the concession contract.

Arthit Project

The Arthit Project is located in the southern part of the Gulf of Thailand. The Company has 80% participating interest in the project and is the operator. The project entered into long-term natural gas and condensate agreement with PTT on a take-or-pay basis.

During the year 2019, the project continued the construction and installation of the production platform and gas pipelines in order to maintain production levels. The Block G8/50, located adjacent to the north of Arthit Project and is held and operated by the Company with 80% working interest, had produced through Arthit Project's Central Processing platform with the natural gas being sold to PTT under Arthit Project's sales contract. In March 2019, Block G8/50 ceased production. However, this does not affect the total sales volume of the Arthit project. The average natural gas sales volume for the project in 2019 was approximately 230 MMSCFD (approximately 37,000 BOED) and average condensate sales volume was approximately 11,000 BPD.

L22/43 Project

The L22/43 Project is located in Phitsanulok and Pichit provinces. The Company is the sole owner and operator.

In 2019, the project temporarily shut down with the plan to replace appropriate producing equipment for the field and transfer mobile production facility to support S1 Project. The project plans to continue the production in mid-2020.

L53/43 and L54/43 Project

The L53/43 and L54/43 Project are located in Suphan Buri, Kanchana Buri, Phra Nakhon Si Ayutthaya and Ang Thong provinces. The Company owns 100% interest in the project and is the operator. Crude oil produced from the project is sold to PTT which is transported via truck to the Bangchak refinery.

During the year 2019, the project's average crude oil sales volume was approximately 1,700 BPD. After December 31, 2019, the production ceased due to no further commerciality.

E5 Project

The E5 Project is located in Khon Kaen Province. The Company holds 20% participating interest in the project with ExxonMobil as the operator. All of the natural gas produced by the E5 Project is sold to PTT on a take-or-pay basis pursuant to a long-term GSA. PTT then transports the gas via pipelines to EGAT's power plant.

In the year 2019, average natural gas sales volume for the project amounted to 8 MMSCFD (approximately 1,300 BOED).

Contract 3 Project

The Contract 3 Project is located in the Gulf of Thailand, off the coast of Surat Thani Province. The Company holds a 5% interest in the project with Chevron as the operator. All of the natural gas and condensate produced from the

project is sold to PTT in according to long-term gas and condensate sales agreements, whilst the produced crude oil is under annual sales agreement and spot cargo with other purchasers.

In the year 2019, the project continued to carry out development drilling activities in order to maintain production levels. The average sales volume of the project in 2019 was approximately 630 MMSCFD (approximately 106,000 BOED) for natural gas, approximately 18,000 BPD for crude oil and approximately 23,000 BPD for condensates.

Contract 4 Project

The Contract 4 Project and Block G7/50, is located in the Gulf of Thailand. The Company holds a 60% interest in the project, with Chevron as the operator. All of the natural gas and condensate produced from the project is sold to PTT under a long-term gas and condensate sales agreements.

In the year 2019, the project sold natural gas at an average rate of approximately 410 MMSCFD (approximately 68,000 BOED) and condensates at an average rate of approximately 18,000 BPD. The project continued to drill additional development wells aiming to maintain production plateau.

G4/43 Project

The G4/43 Project is located in the Gulf of Thailand. The Company holds a 21.375% interest in the project with Chevron as the operator. The project has mutual long-term GSA and crude oil sale agreements with the B8/32 & 9A Project.

In the year 2019, the project continued to carry out development drilling activities to sustain production level. The sales volume of crude oil and natural gas averaged approximately 3,200 BPD and 2 MMSCFD (equivalent to approximately 280 BOED) respectively.

Sinphuhorm Project (EU-1 and E5-North)

The Sinphuhorm Project is located in Udon Thani and Khon Kaen provinces. PTTEP holds directly and indirectly 80.48% participating interest in Sinphuhorm Project after the acquisition of 33.8% and 39% stakes in APICO from Tatex and Coastal Energy in 2019, respectively. APICO has 35% participating interest in Sinphuhorm Project. The project has long-term gas sales agreement with PTT and the natural gas will be sent through the pipeline to EGAT's Nam Phong Power Plant.

In May 2019, the project received approval to extend the petroleum production period for another 10 years until 2029 and 2031 for EU-1 and E-5 blocks, respectively. In the year 2019, sales volume of the project averaged approximately 80 MMSCFD for natural gas (approximately 13,900 BOED) and approximately 270 BPD for condensate.

B8/32 & 9A Project

The B8/32 & 9A Project is located in the Gulf of Thailand, off the coast of Chumphon Province. The Company holds a 25% interest in the project with Chevron as the operator. The project currently has long-term GSAs with PTT and annual crude sales agreement with other purchasers for spot cargo.

During the year 2019, the project continued to carry out development drilling and waterflood operations in order to maintain the crude oil production levels. Sales volume averaged approximately 21,000 BPD for crude oil and approximately 70 MMSCFD for natural gas (approximately 12,000 BOED).

G4/48 Project

The G4/48 Project is located in the Gulf of Thailand, off the coast of Surat Thani Province. PTTEP holds 5% interest in the project with Chevron as the operator. The project has mutual long-term gas sales agreements and crude oil sale agreements for spot cargo with the Contract 3 Project.

In the year 2019, sales volume from the project averaged 3 MMSCFD for natural gas (equivalent to approximately 480 BOED) and approximately 670 BPD for crude oil.

G1/61 (Erawan field)

The G1/61 Project is an exploration and production project, under Production Sharing Contract scheme (PSC). The project is located in the Gulf of Thailand where the existing concession, Block 10-13 (Erawan Field), will expire in 2022, with Chevron as the operator. From the results of Thailand Petroleum Bidding Round for the expired concessions in 2022-2023 in the Gulf of Thailand announced on December 13, 2018, PTTEP Energy Development Company Limited (PTTEP ED), a subsidiary of PTTEP, together with MP G2 (Thailand) Limited, a subsidiary of Mubadala Petroleum (Thailand) Holdings Limited, were awarded the right to explore and produce petroleum in G1/61 (Erawan Field) with the holding interest of 60% and 40% respectively with PTTEP ED as the operator. The Production Sharing Contract (PSC) was later signed on February 25, 2019.

In 2019, the project commenced transition workplan which includes planning for exploration drilling, production platform and gas pipelines, and other studies to ensure gas production delivery at the minimum volume stated in the PSC of 800 MMSCFD starting in 2022 onwards. PTTEP has closely coordinated with the existing concessionaires and the Department of Mineral Fuels to ensure a smooth operational transition.

G2/61 (Bongkot field)

The G2/61 Project is an exploration and production project, under Production Sharing Contract scheme (PSC). The project is located in the Gulf of Thailand where the existing concession, Block 15,16 and 17 (Bongkot field), will expire in 2022 and 2023, with PTTEP as the operator. From the results of Thailand Petroleum Bidding Round for the expired concessions in 2022-2023 in the Gulf of Thailand announced on December 13, 2018, PTTEP Energy Development Company Limited (PTTEP ED), a subsidiary of PTTEP, was awarded the right to explore and produce petroleum with the holding interest of 100% of G2/61 (Bongkot field), and as the operator. The Production Sharing Contract (PSC) was later signed on February 25, 2019.

In 2019, the project commenced transition workplan which includes planning for exploration drilling, production platform and gas pipelines, and other studies to ensure gas production delivery at the minimum volume stated in the PSC of 200 MMSCFD in 2022 and 700 MMSCFD in 2023. PTTEP has closely coordinated with the existing concessionaires and the Department of Mineral Fuels to ensure a smooth operational transition.

Projects located in overlapping claims areas

MTJDA Project

PTTEP has a 50% participating interest in the MTJDA Project with Carigali PTTEPI Operating Company Sdn. Bhd. (CPOC) as the operator. PTTEP, PC JDA Ltd. (a subsidiary of Petronas, Malaysia's Natural Oil Company) and the Malaysia-

Thailand Joint Authority (MTJA) executed a GSA for the sales of the natural gas from the MTJDA Project to PTT and Malaysia. Whilst, crude oil and condensates produced from the project were sold through auction.

Since the year 2019, the project has continuously drilled production wells to maintain production level and is currently in the process of planning for additional exploration and appraisal campaign to further evaluate potentials, expected to be completed in 2021. The project has average sales volume for 2019 of approximately 330 MMSCFD (approximately 54,000 BOED) for natural gas and approximately 9,400 BPD for condensates.

G9/43 Project

The G9/43 Project is located in the Gulf of Thailand with PTTEP as a sole owner and operator. At present, all activities for this project have been suspended awaiting the resolution of the boundary dispute between the governments of Thailand and Cambodia.

(2) International Projects: PTTEP has overseas projects separated into the following regions.

(2.1) Project Activity Highlights in other South East Asia Countries: PTTEP has projects in this region which are located in the Republic of the Union of Myanmar (Myanmar), the Socialist Republic of Vietnam (Vietnam), Malaysia and the Republic of Indonesia (Indonesia). The following section highlights the project activities.

Zawtika Project

The Zawtika Project is a gas project located in the Gulf of Moattama, Myanmar. The Company holds 80% participating interest and is the operator, with Myanma Oil and Gas Enterprise (MOGE) holding the remaining 20% interest. The gas produced from this project is sold to PTT, supplying Thai market under long-term GSA on a take-or-pay basis; and sold to MOGE for domestic consumption in Myanmar under the long-term sales contract. To transport natural gas from Zawtika Project to Thailand, the Company and the joint venture partners established a gas transportation company called Andaman Transportation Limited (ATL) to construct and operate an offshore and onshore pipeline from the project to the Thai border. The project commenced its gas sales in Myanmar in March 2014 and began delivering natural gas to PTT in August 2014.

Since the year 2019, the project has completed the drilling of 6 exploration and appraisal wells in the eastern area and completed the first exploration well in the western area. Currently, the project is in the process of drilling its second exploration well. The project performed a 3D seismic acquisition in the northern part of the area in Q4/2019. Also, to ensure production continuity, the project received approval for the Field Development Plan of Phase 1D from the Government of Myanmar. The average sales volume of natural gas for the project in 2019 was 297 MMSCFD (approximately 48,000 BOED).

Yadana Project

The Yadana Project is a large gas project located in the Gulf of Moattama, Myanmar. The Company holds a 25.5% interest with Total E&P Myanmar (TEPM) as the operator. Natural gas produced from the project is sold to PTT on a take-or-pay basis pursuant to long-term GSA, and a certain portion is sold to MOGE for domestic use in Myanmar. To transport natural gas from Yadana to Thailand, the Company and our joint venture partners established a gas transportation company, called Moattama Gas Transportation Company (MGTC), to construct and operate an offshore and onshore pipeline from the Yadana Project area to the Thai border. Consequently, PTT completed an onshore pipeline section from the Thai border to the EGAT power generation plant in Ratchaburi Province.

Since the year 2019, the project has completed 3D seismic acquisition and is currently in the process of data interpretation and plan for further exploration drilling plans. The project prepares to drill the production wells in Yadana and Badamyar fields in January 2020 to maintain production volume and ensure gas delivery as stated in the long-term sales agreement. Overall, in 2019, the project had average gas sales volume of 776 MMSCFD (approximately 96,000 BOED).

Yetagun Project

The Yetagun Project is a natural gas and condensates producing project located in the Gulf of Moattama, Myanmar. The Company holds a 19.31784% interest in the project with PC Myanmar (Hong Kong) Limited as the operator. All natural gas from the Yetagun Project is sold to PTT on a take-or-pay basis pursuant to long-term GSA. To transport natural gas from Yetagun Project to Thailand, the Company and the joint venture partners established a gas

transportation company called Taninthayi Pipeline Company (TPC) to construct and operate an offshore pipeline and an onshore pipeline (parallel to the Yadana pipeline) from the project to the Thai border.

During the year 2019, the project completed the 3D seismic survey with the plan to continue drilling exploration and production wells in order to maintain production plateau. The project's total sales volume averaged 105 MMSCFD (approximately 17,000 BOED) for natural gas and approximately 2,300 BPD for condensates.

Myanmar M3 Project

The Myanmar M3 Project is located in the Gulf of Moattama, Myanmar. The Company owns 80% participating interest in the project and is the operator. The project has submitted a revised Field Development Plan to the Government of Myanmar in Q4/2019 to align with the Gas to Power plan.

The Gas to Power project in Myanmar is aimed to capture market opportunities for E&P business in Myanmar. At its first stage, PTTEP plans to feed the natural gas from Zawtika Project and Myanmar M3 Project to supply a new power plant for domestic consumption due to the high demand of electricity in the country. For the project's progress, PTTEP conducted a feasibility study and had submitted a project framework to the Government of Myanmar. Currently, the project awaits for Myanmar Government's approval to enter the next step of negotiating a power purchase agreement and carry out preliminary engineering.

Myanmar M11 Project

The Myanmar M11 Project is located in the Gulf of Moattama, Myanmar. The Company owns 100% participating interest in the project and is the operator. In 2018, the Myanmar government approved the extension of the exploration period to a total of 5 years (October 23, 2014 – October 22, 2019)

The project completed the drilling of an exploration well in June 2019 with no commercial reserves found and thereby submitted a request to relinquish the block in September 2019 for Myanmar Government's approval after fulfilling the obligations under the Product Sharing Contract. The termination will be effective after receiving official approval from the Government of the Republic of the Union of Myanmar.

Myanmar MD-7 Project

The MD-7 Project is located in deep water in the Gulf of Moattama, Myanmar. The Company has a 50% interest in the project and is the operator. TOTAL E&P Myanmar (TEPM) joined the consortium with 50% participating interest in 2017.

The project is currently in the process of evaluating the fields' resources potential in order to prepare for an exploration well drilling in Q1/2020.

Myanmar MOGE 3 Project

The Myanmar MOGE 3 Project is an onshore project located in Myanmar. PTTEP holds a 77.5% interest and is the operator of this project. On February 28, 2019, PTTEP received approval from the Government of the Republic of the Union of Myanmar to receive the transfer of the participating interest in MOGE 3 Project from other partners.

In the year 2019, four exploration wells were drilled in 2019 and evaluated to have no commercial reserves and thus were written off.

The Malaysia Project

On March 21, 2019, PTTEP HK Offshore Limited (a subsidiary of PTTEP) signed a Share Sale and Purchase Agreement (SSPA) to acquire 100% of Murphy Oil Corporation's (Murphy) business in Malaysia through the equity in two subsidiaries of Murphy: Murphy Sarawak Oil Company Limited (Murphy Sarawak) and Murphy Sabah Oil Company Limited (Murphy Sabah). The agreement was completed in July 2019. Subsequently, PTTEP has named investments of all projects in Malaysia under 'Malaysia Project'. Details are as follow:

The Malaysia: The Block K Project

The project consists of Kikeh, Siakap North-Petai (SNP) and Gumusut-Kakap (GK) fields which are producing oil fields located in the deep water of offshore Sabah. The Company holds participating interest of 56% and 22.4% in the Kikeh and SNP field respectively and is the operator. The company holds participating interest of 6.4% in the GK field and Shell is the operator. This project was obtained with the acquisition of Murphy's business in Malaysia in 2019.

In 2019, the Kikeh Subsea Gas Lift – Phase 1 Project, which is an Improved Oil Recovery (IOR) project for the Kikeh subsea production system to optimize the reserves recovery level, was successfully completed. The project has average production volume in 2019 for crude oil of approximately 27,000 BPD¹ and 17 MMSCFD¹ for natural gas (approximately 3,200 BOED).

The Malaysia: Sarawak SK 309 and 311 Project are oil and gas producing fields located in shallow water of offshore Sarawak. The Company holds participating interest of 42% and 59.5% in the East Patricia field and remaining area respectively and is the operator. This project was obtained from the acquisition of Murphy's business in Malaysia in 2019.

Both projects started gas production from the 2 infill gas development wells drilled in the first half of 2019. The projects had a total average production volume in 2019 for crude oil and condensate of approximately 26,000 BPD¹ and natural gas around 270 MMSCFD¹ (approximately 46,800 BOED).

The Malaysia: The Block H Project is made up of natural gas fields in development phase located in deep water offshore Sabah. PTTEP holds 56% interest in Rotan field and 42% interest in the remaining area. This project was obtained from the acquisition of Murphy's business in Malaysia in 2019.

The subsea infrastructure is under construction and scheduled to be completed by Q2/2020. The Petronas Floating LNG host facility that will receive gas from the Block H Project is currently being constructed and remains on schedule for February 2020 sail-away. The first production is expected by Q3/2020 and ramping up to its full capacity of 270 MMSCFD.

The Malaysia: Sarawak SK 410B Project is located in offshore Sarawak, Malaysia. PTTEP holds participating interest of 42.5% in the project and is the operator. In March 2019, the project drilled an exploration well in Lang

¹ The average production volumes per day are calculated from the completion date of acquisition transaction.

Lebah-1RDR2 at 3,810 meters deep and found a natural gas field 252 meters thick which proves the significant discovery of gas. In the year 2019, the project received an approval from Petronas to extend its exploration period to three years, until Q1/2023. The project is currently preparing for additional drilling of an appraisal well to evaluate further upside potential in 2020 along with studying for options on field development plan.

The Malaysia: Sarawak SK 314A Project is a shallow-water project and is located in offshore Sarawak, Malaysia. PTTEP holds participating interest of 59.5% in the project and is the operator. This project was obtained from the acquisition of Murphy's business in Malaysia in 2019.

In 2019, the project received approval from Petronas to extend its exploration period to three years, until November 2022 and was in the process of studying the field's resources potential in order to prepare for the drilling of 2 exploration wells in 2021.

The Malaysia: Sarawak SK 417 Project is located in the shallow-water of offshore Sarawak, Malaysia. PTTEP holds participating interest of 80% in the project and is the operator. In the year 2019, the project was in the process of evaluating the field's resources potential in order to prepare for the drilling of 3 exploration wells in 2020.

The Malaysia: Sarawak SK 438 Project is located in the shallow-water of offshore Sarawak, Malaysia. PTTEP holds participating interest of 80% in the project and is the operator. In the year 2019, the project has revised the exploration drilling plan by synergizing with other project to reduce cost. The project is preparing to drill 3 exploration wells in 2020 which is the same period as nearby blocks.

The Malaysia: Sarawak SK 405B Project is located in the shallow water of offshore Sarawak. The Company has 59.5% interest and is the operator. This project was obtained from the acquisition of Murphy's business in Malaysia in 2019.

In the year 2019, the project was in the process of studying the field's resources potential in order to prepare for the drilling of 1 exploration well in 2020.

The Malaysia: Peninsular PM 407 Project is located in the shallow water of offshore Peninsular, Malaysia. On March 21, 2019, the Company signed Production Sharing Contract with Petroliaam Nasional Berhad (PETRONAS) for exploration and production rights of PM407 Block. PTTEP holds participating interest of 55% and is the operator. In 2019, the project was in the evaluation process for petroleum potential and prepared for 2 exploration wells in 2021.

The Malaysia: Peninsular PM 415 Project is located in the shallow water of offshore Peninsular, Malaysia. On March 21, 2019, the Company signed Production Sharing Contract with Petroliaam Nasional Berhad (PETRONAS) for exploration and production rights of PM415 Block. PTTEP holds participating interest of 70% and is operator. In 2019, the project was in the evaluation process for petroleum potential and prepares for 2 exploration wells in 2020.

Vietnam 9-2 Project

The Vietnam 9-2 Project is located offshore southeast of Vietnam, and PTTEP has a 25% interest in the project with Hoan Vu Joint Operating Company as the operator. The crude oil produced from the project is sold to domestic refineries while the produced natural gas is sold to PetroVietnam Gas, a state owned enterprise, for domestic consumption.

In 2019, the Project was able to maintain production plateau. The Project had average sales volume for crude oil of approximately 4,400 BPD and for natural gas of 14 MMSCFD (approximately 3,000 BOED).

Vietnam 16-1 Project

The Vietnam 16-1 Project is located offshore of Vietnam, with PTTEP holding a 28.5% interest, with Hoang-Long Joint Operating Company as the operator. Crude oil production of the project is sold to domestic refineries and exported to international market through a bidding process. Natural gas is sold to the Vietnam Oil and Gas Group, a state-owned enterprise, for domestic consumption.

In 2019, the project started production from 2 wells and is in process of drilling an additional appraisal well in Q1/2020 in order to maintain production level. The sales volume from the project for 2019 averaged approximately 16,000 BPD of crude oil and 7 MMSCFD of natural gas (approximately 1,700 BOED).

Vietnam B & 48/95 Project

The Vietnam B & 48/95 Project is located offshore of Vietnam. The Company holds 8.5% of participating interest in the project with Petrovietnam as the operator. The project was granted approval for the Field Development Plan and is currently in the negotiation process on commercial terms in order to push forward the Final Investment Decision (FID) with targeted first production of 490 MMSCFD (including production from Vietnam 52/97 Project) by the end of 2023.

Vietnam 52/97 Project

The Vietnam 52/97 Project is located offshore of Vietnam. The Company holds 7% of participating interest in the project with Petrovietnam as the operator. The project was granted approval for the Field Development Plan and is currently in the negotiation process on commercial terms in order to push forward the Final Investment Decision (FID) with targeted first production of 490 MMSCFD (including the production from Vietnam B & 48/95 Project) by the end of 2023.

Natuna Sea A Project

The Natuna Sea A Project is located in the west of the Natuna Sea in Indonesia. In 2013, PTTEP Netherlands Holding Coöperatie U.A. (PTTEP NH), a subsidiary of PTTEP, jointly signed a share purchase agreement with Pertamina Hulu Energy, a subsidiary of Pertamina, on a 50:50 basis, to acquire subsidiaries of Hess Corporation holding 23% interest in the Natuna Sea A Project. As a result, PTTEP holds 11.5% interest in the project, with Premier Oil as the operator. The crude oil and condensate produced are sold through auction, while natural gas produced is sold in Singapore for domestic consumption.

In 2019, the project completed the drilling of additional production wells in order to maintain production plateau, with the average sales volume for natural gas of approximately 195 MMSCFD (approximately 34,000 BOED) and for condensates of approximately 1,320 BPD.

(2.2) **Project Activity Highlights in Central Asia:** PTTEP's project in this region is located in the Republic of Kazakhstan (Kazakhstan), with the key project highlights as follows:

Dunga Project

The Dunga Project is a producing oil field located onshore west of Kazakhstan. The Company holds 20% interest, with Total as operator. This project was obtained from the acquisition of Partex Holding B.V. (Partex) which was

completed on November 4, 2019. In 2019, the project had average sales volume for crude oil of approximately 11,000 BPD² and natural gas of 2 MMSCFD (approximately 370 BOED²).

(2.3) **Project Activity Highlights in the Middle East:** PTTEP's projects in this region are located in the Sultanate of Oman (Oman) and the United Arab Emirates (UAE).

PDO (Block 6) Project

The PDO (Block 6) Project is the largest producing oil asset in Central Oman, covering an area of approximately one-third of the country. The Company holds 2% participating interest in this project, with Petroleum Development Oman (PDO) as operator (Operating Consortium). This project was obtained from the acquisition of Partex Holding B.V. (Partex) which was completed on November 4, 2019. The project had an average sales volume in 2019 for crude oil of approximately 618,000 BPD².

Mukhaizna (Block 53) Project

The Mukhaizna (Block 53) Project is a large producing onshore oil field located in southern Oman. The Company holds 1% participating interest in this project, with Occidental Petroleum as operator. This project was obtained from the acquisition of Partex Holding B.V. (Partex) which was completed on November 4, 2019. In 2019, the project had an average sales volume for crude oil of approximately 109,000 BPD².

Abu Dhabi Offshore 1 Project

The Abu Dhabi Offshore 1 Project is located in the offshore north-west of Abu Dhabi, the United Arab Emirates. On January 12, 2019, PTTEP MENA Limited, a wholly-owned subsidiary of PTTEP, and Eni Abu Dhabi B.V., a wholly-owned subsidiary of Eni were selected as the successful bidders from the Abu Dhabi's Open Block Licensing Round for exploration and production rights of Offshore 1 Block. The consortium had 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%.

Currently, the Project is in the evaluation process for petroleum potential for future exploration.

Abu Dhabi Offshore 2 Project

The Abu Dhabi Offshore 2 Project is located in the offshore north-west of Abu Dhabi, the United Arab Emirates. On January 12, 2019, PTTEP MENA Limited, a wholly-owned subsidiary of PTTEP, and Eni Abu Dhabi B.V., a wholly-owned subsidiary of Eni were selected as the successful bidders from the Abu Dhabi's Open Block Licensing Round for exploration and production rights of Offshore 2 Block. The consortium had 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%.

² The average sales volumes per day are calculated from the completion date of acquisition transaction.

Currently, the Project is in the evaluation process for petroleum potential to prepare for drilling of an exploration well in Q3/2020.

(2.4) Project Activity Highlights in Africa: PTTEP's projects in this region are located in the People's Democratic Republic of Algeria (Algeria), the Republic of Mozambique (Mozambique), and the Republic of Angola (Angola), with the key project highlights as follows:

Algeria 433a & 416b Project

The Algeria 433a & 416b Project is located onshore in eastern Algeria. The Company holds a 35% interest in the project, with Groupement Bir Seba (Joint Operating Company) as the operator. The project had average production for crude oil in 2019 of approximately 18,000 BPD.

Algeria Hassi Bir Rekaiz Project

The Algeria Hassi Bir Rekaiz Project is located onshore in eastern Algeria. The Company holds a 24.5% interest and is the operator.

The project has started development on Phase 1 following the conclusion with partners and its approved development plan by ALNAFT (Agence Nationale pour la Valorisation des Ressources en Hydrocarbures – Regulating body of Hydrocarbon Exploration & Production). The development activities commenced in March 2019. First oil production for the initial phase of 10,000-13,000 barrels per day (BPD) is expected in early 2021 with a plan for the second phase production capacity ramping up to around 50,000-60,000 BPD in 2025.

Mozambique Area 1 Project

The Mozambique Area 1 Project is a large natural gas project located offshore of Mozambique. The project is currently in development phase. The Company owns an 8.5% interest with TOTAL S.A. as the operator.

Key project highlights in 2019 is the FID announcement in June to develop the Golfinho-Atum field with the onshore LNG facility of the initial two liquefaction trains, a total nameplate capacity of 12.88 MTPA. The project has successfully secured the long-term LNG sales of 11.1 MTPA with key LNG buyers in both Asia and Europe.

In addition, the project had issued the Notice to Proceed (NTP) for both EPCI Offshore Installation and EPC Onshore Construction Contract. Currently, the contractor has entered the area and has started construction. The project is in the process of procuring LNG container ship. Presently, the project financing process is ongoing, with the plan for first cargo by 2024.

Block 17/06 Project

The Block 17/06 Project is located offshore west coast of Angola. The Company holds 2.5% interest in the project and is the operator. The project is currently evaluating field development plan for production. This project was obtained from the acquisition of Partex Holding B.V. (Partex) which was completed on November 4, 2019.

(2.5) Project Activity Highlights in Australasia: PTTEP has 1 project in this region which is located in the Commonwealth of Australia (Australia) comprising of 8 concession permits with the following as key highlights:

PTTEP Australasia Project

In 2009, the Company acquired 100% of the ordinary shares of Coogee Resources Limited, which was later renamed to PTTEP Australasia Pty Ltd. (PTTEP AA). PTTEP AA owns exploration fields located in the Timor Sea, in Australia and currently holds concessions to 8 permits with two key oil and gas fields, including Cash-Maple Field and Orchid Field (Block AC/P54). For the divestment of the Montara Field, the company sold a 100% stake in the field to Jadestone Energy (Eagle) Pty Ltd on September 28, 2018. The operatorship transfer was completed and approved by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Cash-Maple Field

The Company holds 100% interest in the Cash-Maple Field. In 2018, the field completed a Pre-FEED study and is in the process of studying the appropriate development plan.

Orchid Field (AC/P54 Block)

The AC/P54 Block in Orchid Field had completed drilling of an exploration well in 2019 with successful results. The well encountered gas and condensate with net pay thickness of around 34 meters. The project is planned to include its development along with the Cash Maple Field.

(2.6) **Project Activity Highlights in North and South America:** PTTEP's projects in this region are located in Canada, the Federative Republic of Brazil (Brazil) and United Mexican States (Mexico). The following are significant activities in this region:

Mariana Oil Sands Project

The Mariana Oil Sands Project is located in Alberta, Canada. The Company holds 100% participating interest and is the operator of the Thornbury, Hangingstone, and South Leismer fields. The project is currently under evaluation for an appropriate development plan.

Potiguar Project

The Potiguar Project is a producing oil field located onshore northeast of Brazil. The Company holds 50% participating interest and is the operator. This project was obtained from the acquisition of Partex Holding B.V. (Partex) which was completed on November 4, 2019. The project had average sales volume for crude oil in 2019 of approximately 240 BPD³.

Barreirinhas AP1 Project

The Barreirinhas AP1 Project is located in the Barreirinhas Basin, offshore to the east of Brazil. The Company holds participating interest of 25% in the project, with Shell Brasil Petroleo Ltda. as the operator. The project comprises of 4 exploration blocks: BAR-M-215, BAR-M-217, BAR-M-252 and BAR-M-254. The project is currently evaluating the petroleum potential.

³ The average sales volumes per day are calculated from the completion date of acquisition transaction.

The Brazil BM-ES-23 Project

The Brazil BM-ES-23 Project is located in the Espirito Santo Basin, offshore to the east of Brazil. The Company holds 20% stake in the project, with Petrobras as the operator. The project is currently evaluating the petroleum potential.

The Mexico block 12 (2.4) Project

The Mexico block 12 (2.4) Project is located in the Mexican Ridges, western Gulf of Mexico. The Company holds 20% participating interest in the project, with Petronas as the operator. In 2019, the project received an exploration plan approval from the National Hydrocarbons Commission (CNH) in Mexico, with the exploration period as stated in the agreement starting from June 2020. The project is currently evaluating petroleum potential for further commencement according to the approved exploration plan.

The Mexico block 29 (2.4) Project

The Mexico block 29 (2.4) Project is located in the Campeche, southern Gulf of Mexico. The Company holds 16.67% participating interest in the project, with Repsol Exploración México, S.A. de C.V. as the operator. In 2019, the project received an exploration plan approval from the Comisión Nacional de Hidrocarburos (CNH) in Mexico, with the exploration period as stated in the agreement starting from June 2019. The project is currently evaluating petroleum potential for further commencement according to the approved exploration plan and is in process of preparation for 2 exploration wells to be drilled in Q2/2020.

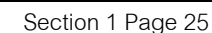
1.4.2 Operational Policy of PTTEP Group

PTTEP has continuously expanded our E&P business, including in related businesses, domestically and internationally. The establishment of subsidiaries and/or associated companies in various regions is necessary for investment purposes, improving our operational efficiency, competing with other international oil companies, operational flexibility, and adjusting to global economic changes. Several factors, such as laws and regulations, financial structures, tax regimes, business and investment conditions, and risk management, should be taken into consideration in any decision to set up a subsidiary or an associated company.

It is our policy to manage PTTEP's subsidiaries in line with PTTEP's business direction and strategy. We designate PTTEP executives and staff to second into key positions of PTTEP's subsidiaries. The strategic direction and financial investment of PTTEP's subsidiaries is overseen by the Company. The boards of directors of the subsidiaries, especially the E&P related business e.g. ARV, have the business management decision authority to the paths to achieve the set targets and strategy. As for the associated companies, we nominate PTTEP representatives to serve as shareholders and/or members of the Board of Directors in accordance with the terms of investment, in order to take part in the decision making of the overall business strategy and policy of these companies. To manage both the subsidiaries and associated companies, we adhere to the Good Corporate Governance and Business Ethics of the PTTEP Group, in order to ensure effectiveness, transparency, fairness, and the attainment of our business goals.

With respect to the selection of directors of the Company's subsidiaries and associated companies, we designate PTTEP executives responsible for projects under each relevant subsidiary and associated company as directors of these entities to ensure that they are managed in line with the Company's business direction and strategy. We may also appoint a local director, if required by the domestic laws and regulations or investment conditions. The subsidiaries and associated companies meanwhile are obligated to report their performance to the Company on a quarterly basis in order to ensure their performance and effectiveness.

As of December 31, 2019, PTTEP invested in 101 legal entities, comprising 81 subsidiaries and 20 associated companies. The PTTEP Group shareholding structure is illustrated as follows:



1.5 Relationship with the Major Shareholder

The Company's petroleum exploration and production business is part of the business group of PTT Public Company Limited (PTT), our major shareholder, the national energy company which engages in a fully integrated petroleum and petrochemical business by strategically investing directly and indirectly through its group of companies, both in the upstream and downstream businesses.

Currently, PTT holds 65.29% of PTTEP's registered and paid-up capital, effectively making the PTT Group the only full-scale natural gas business operator in Thailand. As the major buyer of the Company's petroleum products, PTT, in turn, refines and processes the products and supplies them as energy and raw materials for the power, petrochemical, transportation sectors as well as other industries and households.

In 2019, PTTEP supplied crude oil, natural gas, LPG, and condensate to PTT. Conditions and price settings of all transactions between PTTEP and PTT follow the normal business practices at the arm's length basis conditions for non-related persons or operations. Details of connected transactions between PTTEP and PTT are disclosed in the "Connected Transactions" section.

2. Nature of Business Operation

2.1 Revenue Structure

PTTEP and its subsidiaries' revenues are mainly from sales of petroleum products of which its price is marked to the world fuel price in US Dollar. Thus, PTTEP and its subsidiaries' revenue structure of 2017 – 2019 are presented in US Dollar in order to reflect the Company's revenue structure for the petroleum exploration and production projects in the production phase of PTTEP and its subsidiaries as at December 31, 2019 as the following projects: Bongkot, Contract 4, Arthit, S1, MTJDA, B8/32 & 9A, Contract 3, Sinphuhorm, L53/43 & L54/43, G4/43, E5, PTTEP1, G4/48, L22/43, Zawtika, Yadana, Vietnam 16-1, Natuna Sea A, Yetagun, Algeria 433a&416b, Vietnam 9-2, Malaysia Project, Oman-PDO (Block 6), Oman-Mukhaizan (Block 53), Kazakhstan-Dunga and Brazil-Potiguar projects.

In addition, PTTEP and its subsidiaries recorded revenues proportionately from gas pipeline transportation which are Moattama Gas Transportation Company (MGTC), Taninthayi Pipeline Company LLC (TPC) and Andaman Transportation Limited (ATL).

Revenue structure of PTTEP and our subsidiaries during 2017-2019

Product	Operated by	% of shares held by the Company	2017		2018		2019	
			Revenue (Million USD)	%	Revenue (Million USD)	%	Revenue (Million USD)	%
<u>Sales</u>								
Crude oil	PTTEP	-	137.42	3.03	186.21	3.41	186.00	2.89
	PTTEPI	100	45.38	1.00	53.74	0.98	57.99	0.90
	PTTEPS	100	346.92	7.65	469.42	8.59	493.93	7.69
	Orange	53.9496	87.08	1.92	81.38	1.49	84.97	1.32
	B8/32 Partners	25.0009	36.84	0.81	36.49	0.67	39.38	0.61
	PTTEP HV	100	20.49	0.45	26.07	0.48	26.73	0.42
	PTTEP AP	100	220.59	4.87	143.80	2.63	-	-
	PTTEP HL	100	113.58	2.51	123.07	2.25	107.84	1.68
	Natuna 2	50	2.80	0.06	2.32	0.04	2.73	0.04
	PTTEP AG	100	53.58	1.18	55.93	1.02	66.79	1.04
	PTTEP SBO	100	-	-	-	-	163.24	2.54
	PTTEP SKO	100	-	-	-	-	114.90	1.79
	POC	100	-	-	-	-	47.28	0.73
	PKC	100	-	-	-	-	5.67	0.09
	PBL	100	-	-	-	-	0.40	0.01
Natural gas	PTTEP	-	1,492.21	32.92	1,869.72	34.20	2,332.17	36.30
	PTTEPI	100	789.76	17.42	907.14	16.59	1,038.44	16.16
	PTTEPS	100	42.44	0.94	42.79	0.78	41.22	0.64
	Orange	53.9496	23.95	0.53	20.70	0.38	21.38	0.33
	B8/32 Partners	25.0009	10.09	0.22	9.59	0.18	9.91	0.15
	PTTEP HV	100	1.51	0.03	1.61	0.03	1.82	0.03
	PTTEP HL	100	0.32	0.01	0.91	0.02	1.16	0.02
	Natuna 2	50	61.35	1.35	75.60	1.38	64.26	1.00

Product	Operated by	% of shares held by the Company	2017		2018		2019	
			Revenue (Million USD)	%	Revenue (Million USD)	%	Revenue (Million USD)	%
Natural gas	PTTEP SP	100	139.11	3.07	161.07	2.95	183.30	2.85
	PTTEP SBO	100	-	-	-	-	0.05	0.00
	PTTEP SKO	100	-	-	-	-	72.07	1.12
	PKC	100	-	-	-	-	0.001	0.00
LPG	PTTEP	-	9.04	0.20	7.94	0.14	8.12	0.13
	PTTEPS	100	27.14	0.60	23.82	0.44	24.37	0.38
	PGC	100	-	-	-	-	8.75	0.14
Condensate	PTTEP	-	522.10	11.52	768.63	14.06	712.95	11.10
	PTTEPI	100	49.70	1.10	66.70	1.22	60.19	0.94
	PTTEPS	100	0.76	0.02	0.94	0.02	0.89	0.01
	PTTEP SP	100	47.04	1.04	67.22	1.23	59.61	0.93
	PTTEP SKO	100	-	-	-	-	5.10	0.08
Naphtha	PGC	100	-	-	-	-	2.81	0.04
Total sales			4,281.20	94.44	5,202.81	95.17	6,046.42	94.10
<u>Revenue from pipeline transportation</u>								
Pipeline transportation	MGTC	25.5	36.20	0.80	61.93	1.14	67.59	1.05
	TPC	19.3178	9.35	0.21	7.23	0.13	5.29	0.08
	ATL	80	32.26	0.71	38.40	0.70	43.52	0.68
Total revenue from pipeline transportation			77.81	1.72	107.56	1.97	116.40	1.81
<u>Other income</u>								
Gain on foreign exchange			51.40	1.13	-	-	108.60	1.69
Interest income			59.58	1.31	83.35	1.52	86.23	1.34
Gain on financial derivatives			-	-	13.97	0.26	-	-
Other income			53.27	1.18	50.79	0.93	55.39	0.87
Total other income			164.25	3.62	148.11	2.71	250.22	3.90
Total revenues			4,523.26	99.78	5,458.48	99.85	6,413.04	99.81
Share of gain of associates and joint ventures			9.75	0.22	7.93	0.15	12.35	0.19
Grand total after inclusion of share of gain of associates and joint ventures			4,533.01	100.00	5,466.41	100.00	6,425.39	100.00

For 2019, total revenues for PTTEP and its subsidiaries was 6,425 MMUSD (equivalent to 199,202 MMTHB), an increase of 959 MMUSD or 18% when compared with the revenues in 2018 which was 5,466 MMUSD (equivalent to 176,943 MMTHB). The increase was primarily due to an increase in sales revenue of 843 MMUSD from an increase in natural gas and crude sales revenue. The increase was primarily from Bongkot Project due to the additional acquisition of participating interest, the acquisition of Murphy's business in Malaysia and Partex Holding B.V. including an increase in the average selling price.

2.2 Products and Services

2.2.1 Petroleum

Petroleum is defined as a naturally occurring hydrocarbon mixture, including crude oil, natural gas, condensate, related products, and other hydrocarbon products which are free in nature.

Crude oil is the portion of petroleum which is liquid in nature and obtained from oil wells and gas separation process, yet to be refined or purified.

Natural gas is hydrocarbon in gas or vapor phase at atmospheric temperature and pressure, commonly having methane as its major constituent.

Condensate is a low-density liquid hydrocarbon. It is condensed from hydrocarbon gas. Condensation occurs when gas is produced at the surface where temperature and pressure are lower than those in the reservoir.

Liquefied Petroleum Gas (LPG) is obtained from crude oil refinery or natural gas separation process, primarily consisting of butane and propane.

Crude oil, condensate, and LPG are measured in barrel, while natural gas is measured in cubic foot at the standard conditions (One atmosphere or atm at 60 degree Fahrenheit). All petroleum products can be converted to barrel of oil equivalent (BOE) based on their heat contents. One cubic foot of natural gas has a heating value of approximately 1,000 British thermal units (BTU), whereas one barrel of crude oil has a heating value of approximately 6,000,000 BTU.

2.2.2 Midstream

2.2.2.1 PTT Global LNG Company Limited (PTTGL)

PTTEP and PTT have jointly established PTT GL on June 23, 2017 pursuant to the resolution of PTTEP's Board of Directors No. 1/2560/419 on January 26, 2017 and No. 7/2560/425 on May 25, 2017 to carry out business related to Liquefied Natural Gas (LNG) value chain with equal shareholding at 50%. PTTEP is seeking investment opportunities in LNG as natural gas has seen the highest consumption growth, being the cleanest form of energy among fossil fuels, with an abundance of reserves globally.

As of December 31, 2019, PTT GL had one investment project, a 10% share in PETRONAS LNG 9 Sdn Bhd (a subsidiary of PETRONAS). PTTGL operates an LNG liquefaction plant in Malaysia with 3.6 million tons per annum (31.2 million barrels of oil equivalent) capacity.

2.2.2.2 Oman LNG Project (OLNG)

Partex possesses a 2.0% stake in Oman LNG LLC (OLNG) which owns two 3.4 million tons per annum capacity in liquefaction trains near Sur, Oman. OLNG operates its own trains and a third liquefaction train at the same facility with a capacity of 3.6 million tons per annum, owned through a separate company called Qalhat LNG (QLNG). The three trains have a combined nameplate capacity of 10.4 million tons per annum.

OLNG owns 36.8% of QLNG and Partex is therefore, indirectly, also a shareholder of QLNG (0.736%). The LNG produced is sold largely to South Korea and Japan through existing long-term contracts (SPAs), with the concession due to expire by the end of 2024, in accordance with the SPA. The partners in OLNG are: the Government of Oman (51.0%), Shell (30.0%), Total (5.5%), Mitsubishi Corporation (2.8%), Mitsui & Co (2.8%), Korea Gas Corporation ("KOGAS") (1.2%), Samsung (1.0%), Hyundai (1.0%), Daewoo International (1.0%), Itochu (0.9%) and SK Innovation (0.8%), while in QLNG the partners are the Government of Oman (46.8%), Mitsubishi Corporation (3.0%), Gas Natural Fenosa (7.4%), Itochu (3.0%) and Osaka Gas (3.0%).

2.2.2.3 ADNOC Gas Processing (AGP)

ADNOC Gas Processing (AGP), formerly known as GASCO prior to 2017, is an operating company engaged in processing associated and non-associated natural gas from the UAE's onshore and offshore fields. Gas is supplied to AGP through ADNOC's upstream entities; ADNOC Onshore (formerly ADCO), ADNOC Offshore (formerly ADMA) and non-associated gas fields.

AGP Joint Venture processes Feed-gas from the associated gas supplied from ADNOC Onshore's oil fields in Asab 0/3, Bab and Bu Hasa gas processing facilities. The AGP Joint Venture partners are entitled to the respective share of C3+, i.e. LPG (propane, butane) and paraffinic naphtha production from this associated gas, with the concession due to expire by the end of 2028, in accordance with the SPA.

Partex possesses a 2.0% stake in the AGP Joint Venture, with ADNOC owning a 68% stake and Shell and Total each holding 15%. AGP has a strategic role in ADNOC and the UAE as it yields substantial revenues from exports and is key for domestic electricity generation. Partex had preserved its long standing relations with ADNOC, having been a partner in the gas processing facilities since its inception in 1978.

2.2.3 Gas Transportation Pipeline

PTTEP Offshore Investment Company Limited (PTTEPO), a wholly-owned subsidiary of PTTEP, has major investments in other companies, such as a 80% holding in Andaman Transportation Limited (ATL), 25.5% in Moattama Gas Transportation Company (MGTC), and 19.31784% in Taninthayi Pipeline Company (TPC). The objective of the Company is to invest in gas pipeline transportation connected at the border between the Republic of the Union of Myanmar and Thailand.

2.2.4 Jetty and Warehouse

The Petroleum Development Support Base was established to provide jetty and warehouse services to support PTTEP Group's offshore exploration and production activities both in Thailand and abroad. The Support Base mainly accommodates the Company's own offshore operating projects in Thailand, such as Bongkot Project, Arthit Project, B6/27 Project, as well as those projects of other offshore oil and gas operating companies, such as PTT, Chevron Thailand Exploration and Production Limited, Carigali-PTTEPI Operating Company Sdn Bhd (CPOC), MP G11 (Thailand) Limited, KrisEnergy G10 (Thailand) Ltd., and Mubadala Petroleum (Thailand) Limited. Moreover, the Support Base can also support affiliated offshore operating projects, such as Myanmar M3 Project, Myanmar M11 Project, and Zawtika Project which are located in the Republic of the Union of Myanmar. Currently, our Support Base operates at two branches in the provinces of Songkhla and Ranong.

1. *Petroleum Development Support Base (Songkhla Branch)* solely provides marine jetty berthing and warehousing services. It is owned and operated by PTTEP International Limited (PTTEPI), a subsidiary of PTTEP. The jetty is equipped with 380 meters of wharf which is capable of simultaneously berthing six supply vessels with a size of more than 500 gross tons. The jetty is also equipped with storage facilities and operated with a high standard of material-handling equipment. The Support Base also operates under an international management system which focuses on safety and security while taking into account the issues of occupational health and the environment. It strictly follows the International Ship and Port Facilities Security Code (ISPS Code) which has been approved by the Marine Safety and Environment Bureau of the Royal Thai Marine Department. The jetty is therefore recognized as one of the country's leading shore-based facilities for petroleum exploration and production activities. The 58-rai warehousing service facility is divided into four sections, namely the storage warehouse; open yard; free-zone storage warehouse; and free-zone yard for optimal storage and maintenance purposes of materials and equipment. This facility is also used for certain goods that have been granted tax and duty benefits in its duty-free areas.

2. *Petroleum Development Support Base (Ranong Branch)* provides marine jetty berthing and warehousing services. It is also owned and operated by PTTEPI, though the jetty service, which is operated through Ranong's multi-purpose port, is owned by the Port Authority of Thailand. The jetty has a 150-meter wharf that is capable of simultaneously berthing two supply vessels of more than 500 gross tons each. The Support Base is also fully equipped with storage facilities and standard material-handling equipment. The 25-rai warehousing service facility is divided into four sections, namely the storage warehouse; open yard; free-zone storage warehouse; and free-zone yard for optimal storage and maintenance purposes of materials and equipment. As well, this facility is for certain goods that have been granted tax and duty benefits in its duty-free areas.

To ensure that the services of both Support Base branches meet international standards and top safety levels, performance audits are continually conducted at both sites, emphasizing safety, security, occupational health and the environment. Both are also operated by and equipped with high security systems, such as parameter and high mast lights, barbed-wire fencing, a CCTV system, and 24-hour security guards. PTTEP is also aware of its responsibilities to society and the environment, especially the local communities surrounding the Support Bases. The Company's efforts in this regard have resulted in several international accreditations including the International Environment Control Program (ISO 14001 certification) and the Occupational Health Control Program (OHSAS 18001 certification). The Company has also prepared an Emergency Response Plan under the ISO 22301 standard to handle unexpected and emergency cases as well as to rehearse and exercise our response plans. This ensures that our Support Bases are capable of responding to emergency situations with the latest technologies and methods for continuity of the operation.

2.2.5 Information Technology and Communication Services

PTT ICT Solutions Company Limited (PTT ICT), an affiliate of which 20% shares is owned by PTTEP, has signed an agreement with PTTEP to provide the Company with all information technology and communication services according to the resolution of PTTEP's Board of Directors Meeting No. 10/2549/254 on September 29, 2006. The agreement includes infrastructure design and implementation services, consultancy services, procurement services, and outsourcing services to support the Company's needs in information technology and communication, based on the PTT Group's ICT Policy Strategy for driving and increasing synergy within the group.

PTT ICT has re-registered its name with the Department of Business Development, Ministry of Commerce, to "PTT Digital Solutions Company Limited" since June 22, 2017. The current service contract is valid for five years, starting from January 1, 2016 onwards.

2.2.6 Property Leasing

PTT and PTTEP have jointly established, constructed, and managed the Energy Complex Investment Project under Energy Complex Company Limited. The complex is considered to be the energy business center of the country, also comprising the Ministry of Energy, subsidiaries and associated companies of the PTT Group, as well as some private energy companies.

2.2.7 Manpower Services

PTTEP Services was established in accordance with the resolution of PTTEP Board Meeting No. 12/2546/216. With its primary business objective to supply manpower to support PTTEP Group's operational activities, the Company ensures that PTTEP is sufficiently staffed for both domestic and international expansion.

To fulfill this objective, PTTEP Services has recruited and hired various types of staff, such as specialists, engineers, operators, and technicians, both Thais and non-Thais, to serve PTTEP since July 1, 2004. The Company has continuously developed and improved its compensation, welfare and benefits to ensure its staff are provided with fair compensation and good welfare and benefit programs that make them feel motivated. This has also helped to improve its competitiveness in the market.

To enhance staff's capability to effectively support PTTEP operations, PTTEP Services has provided several training and development programs based on PTTEP's business requirements. The programs focus on compulsory Safety, Security, Health and Environment (SSHE) training, functional training as well as soft-skill training in areas of innovation and interpersonal skills. In addition, it has provided basic training, including English and computer courses, to help the staff perform their jobs effectively.

PTTEP Services' business has continuously grown and expanded. Apart from supplying manpower for PTTEP, it has also provided manpower for Carigali PTTEPI Operating Company Sdn. Bhd. (CPOC), a PTTEP joint-venture company in Malaysia.

2.2.8 AI and Robotics

AI and Robotics Ventures Company Limited (ARV) was incorporated on September 21, 2018, as a wholly-owned entity of EP-Tech Ventures Holding Company Limited, a subsidiary of PTTEP. ARV's strategic direction is to become a platform of choice which delivers cutting-edge AI and robotics solutions. In order to achieve its commitment to delivering best-in-class performance and maintaining competitiveness, ARV focuses on three key pillars: 1) research and development, and integration of cutting-edge AI and robotics technological capabilities across multiple industry verticals, 2) comprehensive and efficient data-driven AI, yielding robotics solutions to business challenges, and 3) a unique business platform to enable sustainable growth through open-innovation and symbiotic partnerships. Its products and services simultaneously respond to an increasing demand of both energy and other industries, including agriculture, security, and environmental conservation, all of which are the key drivers for Thailand and Southeast Asian economies.

2.3 Permission to Operate, Concession or Business Promotion

PTTEP operates a petroleum exploration and production business in the Kingdom of Thailand and abroad. The Company's investments in foreign countries must comply with all applicable laws and regulations of those invested countries, such as Production Sharing Contract, Concession, or Services Agreement. Within the Kingdom of Thailand, the Company must comply with the Petroleum Act B.E. 2514 and its amendments which set out the rights to explore, exploit and produce petroleum under the concession regime, production sharing contract regime and services agreement regime. Key points in the petroleum business are as follows:

2.3.1 Demarcation of Petroleum Exploration and Production Areas

The Department of Mineral Fuels, Ministry of Energy, as the government authority under the petroleum law, is responsible for demarcating each petroleum exploration and production areas (Block) and inviting oil companies to submit their applications requesting awarding concessions, production sharing contracts or services agreements. In considering any awards, the Petroleum Committee has a duty to render advice to the Minister. The Minister with the approval of the Cabinet has the authority to sign a concession, production sharing contract or services agreement to award the right to explore, exploit and produce petroleum. The qualifications of each applicant will be considered by the State to award the right to explore, exploit and produce petroleum, which includes investment funds to be brought in and used in the exploration activities, transfer of knowledge and technology, employment of Thai nationals, and the utmost benefits of the State.

2.3.2 Characteristic of Joint Venturer

A petroleum concession, a production sharing contract or a services contract may be awarded to a single concessionaire/contractor or multiple concessionaires/contractors. Since the risk of the petroleum exploration and production business is relatively high, it is common for concessionaires or contractors to form a joint venture in order to diversify such business risk. In a joint venture, a company will be designated as the “operator” to conduct the exploration and production operations on behalf of its partner(s) and commonly under the supervision of a management committee or an operating committee which is composed of representatives of all parties. Other non-operator companies will participate in making operational decisions including technical, work programs and budgets. The operator will issue a cash call to all parties to finance the project. Generally, whether an oil company will become a project operator depends on its investment conditions, readiness, and business strategy in that particular project.

2.3.3 Nature of Operations and Investment Decisions

Before an oil company decides to invest in petroleum exploration in the Kingdom of Thailand or abroad, it has to consider the chance of successful exploration as well as other investment risk factors. A thorough study on the information available is conducted to determine whether the area has high petroleum potential and whether the project is commercially feasible. The success ratio of exploration wells in neighboring areas as well as other risk factors in the invested countries must also be taken into account. Assuming that the project is commercially feasible, the company will apply for the right to explore, exploit and produce petroleum or, if such right is already awarded, “farm-in” to the existing petroleum concession.

After the oil company is awarded the right to explore, exploit and produce petroleum, an exploration program will be conducted, normally taking 2-3 years. If petroleum reserves are found, the oil company will compare the amount of investment funds required for the development phase and the expected sales value of the petroleum based on the commercialized petroleum reserves. If the study indicates that the reserves are worth investing in, this means that the petroleum field is considered to have commercial viability; further investment onto development phase is therefore justified. The operator shall then apply for an approval of petroleum production and simultaneously may start its production activity. The operator is still able to explore the rest of the existing areas if it is within the time frame of the exploration period as mentioned in the concession, the production sharing contract or the services contract. At this stage, the operator must have a certain degree of confidence about the investment. However, as the investment

expenditure required for such development phase is very high, the operator must normally be able to identify buyers of the petroleum in advance, and a long-term sales agreement for the petroleum to be produced should be signed. Currently, PTT Public Company Limited ("PTT") is the biggest petroleum buyer in Thailand. The principal elements of the sales agreement for petroleum generally include the determination method of the sales price and quantity of the petroleum to be delivered. Sales of natural gas from domestic areas is made at the wellhead, while sales of natural gas from foreign areas is made at the Thai borders. PTT is currently responsible for installation of most of the gas pipelines for the production amount as specified in the gas sales agreement. Sales of crude oil is made at the buyer's refinery, while sales of condensate is made at the Floating Storage Unit (FSU) near the wellhead.

2.3.4 Description of Laws Relating to the Business

Operation of the petroleum business in Thailand is governed by two major enactments, namely the Petroleum Act B.E. 2514, and the Petroleum Income Tax Act B.E. 2514 and its amendments. The concessionaire and contractor must be a limited company or a juristic person which has the same status as a limited company, established under the laws of Thailand or foreign laws. Several major features of these laws are as follows:

(1) Concession

(1.1) The concessionaire(s) and the co-venturer(s) shall pay the royalty, which is normally in cash. The Minister may authorize such royalty payment in kind with prior notice of not less than six months. The royalty can be used as credit against income tax (Thailand I) or deducted as expenses (Thailand III).

(1.2) Petroleum income tax is prescribed at a rate not lower than 50% and not higher than 60% of the net profit from the petroleum operation.

(1.3) Interest paid cannot be deducted as expenses for income tax purposes.

(1.4) Each concessionaire could be awarded concessions with no limitation in the number of blocks.

Thailand I for the petroleum concessions awarded by the Ministry of Industry¹ from B.E. 2514 to B.E. 2532 and those onshore petroleum concessions issued before B.E. 2525

Thailand II² for the onshore petroleum concessions awarded by the Ministry of Industry from B.E. 2525 to B.E. 2532

Thailand III for the petroleum concessions awarded by the Ministry of Industry since B.E. 2533

¹ Currently, the Ministry of Energy

² Under Section 36 of the Petroleum Act (No. 4) B.E. 2532, all petroleum concessionaires under Thailand II have applied to be subject to the criteria under Thailand III.

Details of the Terms: Thailand I, II, and III

TERM	THAILAND I	THAILAND II	THAILAND III
Royalty Rates	12.5% of income from sales or disposal of petroleum, which may be treated as tax credit	12.5% of income from sales or disposal of petroleum, which may be treated as tax credit	progressive rate at sliding scale of 5-15%, deemed to be expenses, which could be deducted in tax calculation
Petroleum Income Tax	50% of net profit from petroleum business operation	50% of net profit from petroleum business operation	50% of net profit from petroleum business operation
Special Benefits	-	annual benefits and annual production bonus	special remunerator benefits which may be taken as deduction
Exploration Period	8 years with 4-year extension	8 years with 4-year extension	6 years with 3-year extension
Production Period	not exceeding 30 years from exploration's expiration date, with extension not exceeding 10 years	not exceeding 30 years from exploration's expiration date, with extension not exceeding 10 years	not exceeding 20 years from exploration's expiration date, with extension not exceeding 10 years
Concession Areas	not exceeding 10,000 sq.km. per exploration block, up to five exploration blocks	not exceeding 10,000 sq.km. per exploration block, up to five exploration blocks	not exceeding 4,000 sq.km. per exploration block, up to five exploration blocks ³

(2) Production Sharing Contract

(2.1) All petroleum operation expenditure shall be responsible by the contractor whereas the contractor shall recover such expenditure by deducting from the production. The expenditure that can be deducted shall be the actual expenditure according to the work program and budget approved by the Director General of the Department of Mineral Fuels, the Ministry of Energy, but shall not exceed 50% of the overall production.

(2.2) The contractor shall pay the royalty to the State at the rate of 10% of the overall production.

(2.3) The remaining production after deducting the royalty and the recoverable expenditure shall be shared with the contractor, but not exceeding 50%.

(2.4) Petroleum income tax is prescribed at a rate not lower than 20% of the net profit from petroleum operation.

(3) Services Contract

(3.1) Services contract can be either the hiring for an exploration and production contract, the hiring for an exploration contract or the hiring for a production contract.

(3.2) The contractor shall be paid by the State according to the terms and conditions of each services contract.

(3.3) All petroleum operation expenditure shall be responsible by the contractor.

(3.4) Payment shall be made to the contractor after deducting the royalty.

³ Under Section 28 of the Petroleum Act (No. 6) B.E. 2550, effective from October 18, 2007, there is currently no limitation in the number of blocks.

2.4 Market and Competition

PTTEP has invested in both domestic and overseas projects, including the Republic of Indonesia, the Republic of the Union of Myanmar, the Socialist Republic of Vietnam, Malaysia, the Commonwealth of Australia, Canada, the United Mexican States, the People's Democratic Republic of Algeria, the Republic of Mozambique, the Federative Republic of Brazil, the Republic of Kazakhstan, the Republic of Angola, the United Arab Emirates, and the Sultanate of Oman. The target markets are both domestic and overseas where we have invested in. The Company's petroleum products include natural gas, crude oil, condensate, naphtha and LPG.

In 2019, total sales by the Company and our subsidiaries averaged 350,651 barrels of oil equivalent per day (BOED). The total sales ratio of natural gas to liquid was 71% : 29% by volume and 63% : 37% by revenue, as shown below.

Product	Sales Volume	Value (million USD)
Natural Gas	560,849 MMSCF or 90.72 MMBOE	3,765.78
Condensate	14.05 MMBBL	838.74
Naphtha	25,375 metric tons or 0.29 MMBOE	11.55
Crude Oil	22.32 MMBBL	1,397.39
LPG	72,980 metric tons or 0.60 MMBOE	32.49

2.4.1 Marketing Characteristics

PTTEP sells our outputs from domestic and regional projects (i.e. the Republic of the Union of Myanmar and the Malaysia-Thailand Joint Authority (MTJA)) primarily to the Thai market through PTT Plc. (PTT), the major buyer and processor of all the products. PTT then turns the processed products to the country's power sector, petrochemical industry sector, transportation sector, industry sector, and household sector.

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

(1) Natural Gas

Due to capital-intensive investment in developing oil and gas exploration business, gas sales agreements (GSAs) must be agreed or signed between the buyer and seller before any major investment is made. GSAs are typically a long-term contract, ranging from 15 to 30 years. Prices, volumes, and points of sale are stipulated for each of the contracts. Currently, the designated transfer points for all domestically sold gas are at the Central Processing Platform (CPP), from which the buyer will invest in the transmission system to the CPP. The delivery point of the gas sold from the Republic of the Union of Myanmar to Thailand is however at the Myanmar-Thai border. In this case, the seller is responsible for investment in the transmission pipelines from the CPP to the border. Gas prices are usually linked to fuel prices and several key economic indices as well as to reflect the investment costs and be competitive comparing with fuel oil for the GSA period.

Sales volumes are based on the assessed reserves on the negotiation date. GSAs stipulate obligations between buyer and seller for a committed volume. If the buyer does not take the volume of gas as committed to in the GSA, it must pay for the committed volume whether the gas is taken or not (Take-or-Pay). As a consequence, the buyer is entitled to take delivery of free of charge in subsequent years (Make-up Gas). On the other hand, should the seller fail to deliver as nominated by the buyer, the buyer is entitled to an agreed discount price of the undelivered volumes as stipulated in the agreement (Shortfall).

(2) Condensate and Crude Oil

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

(3) Naphtha

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

(4) LPG

LPG produced from S1 Project is sold to PTT under a long-term contract with the price in line with the government's policy and announcements by the Joint Committee on Energy Policy Administration.

Moreover, LPG produced from ADNOC Gas Processing Project (AGP), the largest gas processing complex located onshore of Abu Dhabi, UAE, is sold under short-term contract which selling price refer to official selling price in the region.

Sales of petroleum products from PTTEP's international fields vary from country to country as follows:

- Zawtika, Yadana and Yetagun projects in the Republic of the Union of Myanmar: Approximately 80% of the produced natural gas from Zawtika and Yadana projects is primarily sold to Thailand through PTT, while the remaining 20% is sold to the Republic of the Union of Myanmar for its domestic power generation. Nearly all of the condensate from Yetagun Project in 2019 is sold in the regional spot markets due to the revamping of domestic refinery. All the gas output from Yetagun Project is currently sold to PTT for the consumption in Thailand.
- Vietnam 9-2 and Vietnam 16-1 projects in the Socialist Republic of Vietnam: All of the oil output produced from Vietnam 9-2 Project is sold to Binh Son Refining and Petrochemical Company Limited (BSR), a refinery in the Socialist Republic of Vietnam, for the consumption in the Socialist Republic of Vietnam. The produced crude from Vietnam 16-1 Project is sold in the regional spot markets through auction, while the produced gas from both projects is sold to Vietnam Oil and Gas Group, a state enterprise, for the consumption in the Socialist Republic of Vietnam.
- Algeria 433a & 416b Project in the People's Democratic Republic of Algeria: The Bir Seba Field has been commenced the production with its first commercial sales of crude oil since December 2015. The crude oil is sold and marketed by PTT as the marketing agent in the spot markets.
- Potiguar Project in Brazil: A producing oil field in Brazil with production volume in 2019 around 300 barrel per day. The crude oil is sold under short-term contract to domestic refinery.

- Dunga Project in the Republic of Kazakhstan: A producing oil field located onshore west of the Republic of Kazakhstan, operated and sold by Total. The crude oil is sold under short-term contract to both domestic and export market.
- Block K Project and the Sarawak SK309 and SK311 Project in Malaysia: Crude oil and condensate from SK309 and SK311 projects, together with crude oil produced from Kikeh, Siakap North-Petai (SNP) and Gumusut-Kakap (GK) from Block K project are sold under short-term contract and spot markets. Natural gas produced from the SK309 and SK311 project is sold under long-term contract to Petroliaam Nasional Berhad (PETRONAS), the Malaysia national oil company, and used as gas supply to the Petronas LNG complex in Bintulu.

For MTJDA Project in Malaysia-Thailand Joint Development Area, the produced natural gas is sold to PTT for the consumption in Thailand. Starting from April 2015, the gas has been sold to Malaysia according to the Gas Balancing Agreement between PTT and Petroliaam Nasional Berhad (PETRONAS). The condensate output meanwhile has been marketed and sold by a co-marketing agent of PTT and PETRONAS Trading Corporation Sdn Bhd (PETCO) through auction in the spot markets.

2.4.2 Competition

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

Regarding the approximate domestic production in 2019, PTTEP's petroleum production accounts for 37% of the total domestic production in 2019, making the Company the leader among the domestic producers, detailed as follows:

Producers	% Domestic Production Volume
PTTEP	37
Chevron	28
MOECO	9
PETRONAS	9
Total	7
Others	10

Source: Department of Mineral Fuels, Ministry of Energy (as of December 2019)

Currently, the shale gas revolution is driving a dramatic restructuring of the global natural gas markets. It creates new opportunities and incentives for lower-cost natural gas to higher-value global markets via LNG exports. The global LNG demand growth is therefore expected to be stronger, resulting in an increase of its market share in the future.

2.5 Production

2.5.1 Exploration and Production Stages and Technology

Petroleum exploration and production can generally be divided into four major stages as follows:

(1) Exploration stage: This is the first step to identify the areas with reservoir potential. The main activities conducted in this stage include:

- Primary geological and geophysical surveys
- Seismic acquisition, processing and interpretation
- Exploration well drilling and testing

(2) Appraisal/Delineation stage: This stage mainly involves with additional study to increase the certainty of estimating size and properties of the reservoirs. The main activities conducted in this stage include:

- Detailed study of petroleum geology and additional seismic survey
- Reservoir formation evaluation and conceptual development design
- Appraisal/Delineation well drilling and testing

(3) Development stage: This is the last stage prior to the production. The main activities conducted in this stage include:

- Field development plan design and optimization
- Production facilities design, construction, and installation
- Development well drilling

(4) Production stage: This is the stage where petroleum and associated products are flowed through the pressure controlled equipment (wellhead) and processing facilities including measuring equipment to obtain the production rates of all of the productions. The main activities conducted during this stage include:

- Monitoring of production rate, proportion between produced gas, crude oil or condensate, and water, as well as pressure decline rate
- Forecasting of the future reservoir performance
- Well work-over and facilities maintenance

PTTEP has been well equipped in terms of manpower, technology and equipment to operate the business efficiently according to the Company's target.

2.5.2 Petroleum Reserves

Petroleum reserves can be divided into two categories, namely, Proved Reserves and Unproved Reserves according to the level of certainty.

(1) Proved Reserves are those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations.

Practically, Proved Reserves mean the petroleum in reservoirs which can be commercially produced based on supporting data gathered during the well testing process. In some cases, reserves may be classified as Proved Reserves essentially when the results from well logging and/or analyzing of the core samples can prove that the reservoirs and petroleum in the reservoirs are similar or comparable to those of the neighboring areas which have already been commercially produced or with the potential to be produced according to their well testing results. In addition, Proved Reserves must be able to be produced by using the existing production equipment or with the production equipment that have a firmed plan to install in the future.

(2) Unproved Reserves are defined based on geoscience and/or engineering data similar to that used in the estimation of Proved Reserves but with technical or other uncertainties which preclude such reserves from being categorized as Proved. Unproved Reserves can be further categorized into Probable Reserves and Possible Reserves as follows:

- Probable Reserves are those additional quantities of petroleum obtained from an analysis of geoscience and/or engineering data similar to that used in the estimation of Proved Reserves but with less production possibility.
- Possible Reserves are those additional quantities of petroleum obtained from an analysis of geoscience and/or engineering data similar to that used in the estimation of Probable Reserves but with less production possibility than both Proved Reserves and Probable Reserves.

The Company's Proved Reserves are composed and reviewed annually by our earth scientists and reservoir engineers to ensure the industry's rigorous professional standards.

The Proved Reserves are reported on a gross basis which includes the Company's net working interest and related host country's interest. As of December 31, 2019, the total amount of Proved Reserves of PTTEP Group's projects¹ was 310 million stock-tank barrels (MMSTB) of crude oil and condensate², and 5,097 billion standard cubic feet (BSCF) of natural gas or 830 million barrels of oil equivalent (MMBOE). The total amount of Proved Reserves in terms of oil equivalent was therefore 1,140 MMBOE. Details of the Company's Proved Reserves are shown in the following table:

¹ Include APICO Joint Venture project

² Include LPG

PTT Exploration and Production Public Company Limited
Crude and Condensate and Natural Gas Proved Reserves ⁽¹⁾
As of December 31, 2019

	Crude and Condensate ⁽²⁾ (Million Barrels)			Natural Gas (Billion Cubic Feet)			Barrel of Oil Equivalent (Million Barrels)		
	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
<i>Company's share of reserves of consolidated companies</i>									
Proved Reserves as of Dec 31, 2018	116	48	164	2,181	1,105	3,286	470	207	677
1) Revision of previous estimates	13	(1)	12	160	(53)	107	41	(4)	37
2) Improved recovery	1	0	1	1	1	2	2	1	3
3) Extensions and discoveries	2	45	47	21	954	975	5	207	212
4) Purchases/Sales of petroleum in place	21	106	127	816	582	1,398	153	206	359
5) Production	(30)	(11)	(41)	(475)	(212)	(687)	(107)	(43)	(150)
Proved Reserves as of Dec 31, 2019	123	187	310	2,704	2,377	5,081	564	574	1,138
<i>Company's share of reserves of equity companies ⁽³⁾</i>									
Proved Reserves as of Dec 31, 2019	0	-	0	16	-	16	2	-	2
Total Proved Reserves as of Dec 31, 2019	123	187	310	2,720	2,377	5,097	566	574	1,140

(1) The Proved Reserves are reported on a gross basis which includes the Company's net working interest and the related host country's interest.

(2) LPG included

(3) Included Reserves from APICO Joint Venture project

Furthermore, in order to improve efficiency, check and balance of the reserves estimation, reporting and disclosure, the company maintains a Reserves Committee which has the following roles and responsibilities:

- Review and endorse the Company's Annual Reserves.
- Review and approve Major Changes of Reserves, and Reserves for Newly-Acquired Project
- Ensure that all activities that related to reserves estimation and disclosure of reserves information conform to regulatory and legal requirements as well as to corporate and international standards.
- Approve Annual Reserves Audit Plan, appoint Reserves Auditor, as well as approve Reserves Audit Report to ensure compliance with Company's framework and continual process improvement.

2.5.3 PTTEP Petroleum Production

In 2019, the total production of PTTEP Group¹ was 151 MMBOE, consisting of 41 MMSTB of crude oil and condensate² and 690 BSCF or 110 MMBOE of natural gas. This was equivalent to a production rate of approximately 413,640 barrels of oil equivalent per day (BOED) which was approximately 54,255 BOED or 15.1% increase from the previous year. The increase was mainly due to the acquisition of Murphy Oil Corporation in Malaysia and Partex Holding B.V.

2.5.4 Environmental Impact Management

PTTEP emphasizes systematic management of environmental stewardship in our organization. It is to manage the resources & environment and concurrently develop the organization as well as focus on pollution prevention and environmental protection. With this management, it helps us reduce impacts on the environment, create value for the Company, stakeholders and the environment.

Hence, PTTEP conducts an environmental impact assessment study prior to commencing new exploration and production projects. It is legally required to ensure that environmental mitigation measures and monitoring programs have been put in place to minimize environmental impacts arising from operations for both domestic and international projects. Mitigation and monitoring of the above environmental programs are controlled and regulated by local government agencies. In Thailand, there are two main agencies, namely, the Department of Mineral Fuels (DMF) of the Ministry of Energy, which plays a major role in regulating the activities of exploration and production companies, and the Office of Natural Resources and Environmental Policy and Planning (ONEP) of the Ministry of Natural Resources and Environment, which issues directives and approvals of environmental impact assessments study reports prior to the commencement of exploration, drilling, and production projects. PTTEP also submits the environmental compliance and monitoring reports to both main agencies to assure our environmental performance and compliance with the approved mitigation measures and monitoring programs.

To ensure that the environmental impacts from our operations have been minimized, we have introduced and implemented the following environmental policies and targets:

¹ Include APICO Joint Venture project

² Include LPG

- Targeting greenhouse gas emission (GHG) intensity reduction by at least 25% by 2030 from base year 2012 covering all operations in both Thailand and international projects including Petroleum Development Support Base and implementing the projects and technologies for GHG emission reduction.
- Targeting zero oil and chemical spill.
- Targeting no net loss for biodiversity in IUCN protected area and no operations in World Heritage sites.
- Avoiding operations in areas at risk from water scarcity and ensuring no impact on water users and communities.
- Re-injecting produced water to reservoirs.
- Targeting zero hazardous waste to landfill by 2020.

Details of the Company's performance against the targets above are disclosed in the 2019 Sustainability Report.

2.5.5 Performance over the Past Three Years

During 2017 - 2019, PTTEP has strictly complied with both Thai and international legislation, and other regulations and requirements concerning the area of Safety, Security, Health and Environment (SSHE). The achievements of our environmental performance are represented by the following national and international, awards and recognition:

(1) PTTEP has achieved a member status of the Dow Jones Sustainability Indices (DJSI) World in Oil and Gas Upstream & Integrated Industry for the sixth consecutive year (2014 – 2019). The Company is also named the Industry Leader in this category for the second time since the first one, received in 2016. The worldwide recognition as the Industry Leader was derived from higher best-in-class ratings and top scores (100/100) ratings PTTEP received in multiple categories.

(2) PTTEP was listed in the 2019 Thailand Sustainability Investment (THSI) group from The Stock Exchange of Thailand for the fourth consecutive year as a listed company that has operated the business with sustainability with outstanding performance in the dimension of Environmental, Social, Economic and Good Governance performance.

(3) PTTEP's SSHE performance report as included in the Company's Sustainability Report has been assured by an independent third party and rated by the Global Report Initiative (GRI) for the seventh consecutive year.

(4) PTTEP continued implementing our Environmental Management System to comply with the revised edition of the ISO 14001 (ISO 14001:2015) international standard and certified by AJA Registrars Limited (which currently is SOCOTEC Certification (Thailand) Co., Ltd.) under the accreditation of the United Kingdom Accreditation Service (UKAS). By adopting the ISO 14001 "One Common System" for all certified sites, the Company has improved the efficiency of our environmental management system by continuously upgrading the environmental practices in maintaining, developing, and reducing environmental impacts in the following areas:

- Head Office
- Greater Bongkot North and Bongkot South fields of the Bongkot Project
- Arthit Project
- S1 Project
- PTTEP 1 Project and L53/43 & L54/43 Project
- Sinphuhorm Project
- PTTEP Petroleum Development Support Base (Songkhla and Ranong)
- PTTEP Core Research Center
- Block M9, Zawtika Operation Center at Dawei, Office at Yangon in the Republic of the Union of Myanmar

PTTEP was the first company in the E&P business in Thailand which earned certification of this standard.

(5) PTTEP continued to maintain the OHSAS 18001:2007 Occupational Health and Safety Standard, being certified by AJA Registrars Limited and accredited by ANSI-ASQ National Accreditation Board (ANAB) for our safety management system, which enables us to control occupational health and safety risks as well as to improve the performance. The projects which have received the certification and accreditation are S1, PTTEP 1, L53/43 & L54/43, Sinphuhorm, PTTEP Petroleum Development Support Base (Ranong), Arthit, and Bongkot (for both North & South fields). The Company also plans to expand coverage of the OHSAS to international assets.

(6) PTTEP submitted Safety, Security, Health and Environment performance reports to the Department of Mineral Fuels on a monthly and annual basis. These included the annual SSHE audits at operating sites by the Department of Mineral Fuels.

(7) PTTEP received the Green Meeting Certificates for PSB Songkhla (Plus Level) and PSB Ranong (Standard Level) from the Thailand Business Council for Sustainable Development (TBCSD). These awards recognize PTTEP as an outstanding corporation that organizes meetings in a way that maximizes the usage of resources and minimizes energy consumption as well as environment impacts.

(8) PTTEP received the 2019 Green Office award at the Excellence (G-Gold) Level from the Minister of the Ministry of Natural Resources and Environment. The event was held by the Department of Environmental Quality Promotion. PTTEP is the first company in the PTT Group and in the E&P sector that has received the highest award from this organization. In addition, the Company received the Green Procurement Certificate from the Thailand Environment Institute.

(9) PTTEP received a LESS (Low Emissions Support Scheme) Award Letter of Recognition from the Minister of Natural Resources and Environment. PTTEP received this award for the third consecutive years from The Thailand Greenhouse Gas Management Organisation (TGO), for its various Greenhouse Gas Reduction projects at the Head Office, Songkhla Petroleum Development Base and Ranong Petroleum Development Base. The total amount of greenhouse gas emissions reduced was 186,670 kilograms of carbon dioxide equivalent.

(10) PTTEP received a Thailand Energy Award 2019 in the category of energy conservation for transportation. This award underscores PTTEP's success in supply vessels logistics and transportation management which saved more than 13.6 million litres of diesel fuel consumption per year during 2016-2019. The awards ceremony was organized by the Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy.

(11) PTTEP received a Best Practice Award in ISO 14001 & OHSAS 18001 presented by AJA Registrars Co., Ltd. and SOCOTEC Group. PTTEP is one of the 21 companies that were voted by AJA's Auditors and Management, out of more than 900 AJA certificate holders in Thailand.

(12) PTTEP was recognized as a constituent member of the FTSE4Good Index Series for the fourth consecutive year. FTSE Russell confirmed that PTTEP had been independently assessed according to the FTSE4Good criteria and satisfied the requirements to become a constituent member of the FTSE4Good Index Series. Created by the global index provider FTSE Russell, the FTSE4Good Index Series is designed to identify companies that demonstrate strong Environmental, Social and Governance (ESG) practices measured against international standards. PTTEP is regarded as one of the top 10 for both Environmental and Governance dimensions in the Energy sector.

(13) PTTEP in cooperation with PTT Group is in the process of developing the PTT Group Oil Spill Response Plan and Oil Spill Remediation Guidelines. With this cooperation, the Oil Spill Response of PTT Group has been prepared to be aligned with the National Oil Spill Response Plan of the Marine Department. This is to prepare an effective emergency response that mitigated the potential consequences of a spill incident to people, the environment, company assets and reputation and enables normal operations to be resumed efficiently.

In terms of our environmental management and stewardship, the spill rate is also set up as one indicator for monitoring the effectiveness of our performance management. During 2017 - 2019, the spills accounted for 0.26, 0.60 and 0.64 tonnes per million tonnes of production, respectively. Details of spill incidents and mitigation actions are disclosed in the 2019 Sustainability Report.

2.5.6 Environmental Disputes or Lawsuits and Approach to Resolution

Details are disclosed in the "Legal Dispute" section.

2.5.7 Safety, Security, Health and Environment Management

PTTEP develops, implements, and continuously improves our Safety, Security, Health and Environment (SSHE) culture based on the long-term roadmap to achieve our ultimate goal, which is to prevent any accident that may result in injury, occupational illness, and any other work-related harm. In 2019, PTTEP's SSHE strategy was mainly focused on improving the Company's SSHE Management System (SSHE MS) in both operational and process safety, and the strengthening of our SSHE culture. We aim to reach the highest level within our SSHE Culture Maturity Model, primarily by enhancing the awareness of our line management with regard to their roles and responsibilities. Furthermore, we will be promoting SSHE leadership awareness among our employees and contractors at all levels. Importantly, PTTEP is still dedicated to carry through with strong efforts to improve and sustain the environment in all areas of our operations. Successful implementation of these SSHE requires full commitment from all of PTTEP Group's personnel, from the highest executive officer to the operational staff and contractors.

In 2019, PTTEP's SSHE Key Performance Indicators of Lost Time Injury Frequency Rate (LTIF), Total Recordable Injury (TRIR) and Spill rate were better than those of the previous year and in the top quartile of IOGP's performance. This is a direct result of our SSHE risks management and control to be As Low As Reasonably Practicable (ALARP) and our ongoing incident prevention campaigns in operations.

PTTEP's emphasis and commitment to continuously improve SSHE implementation, so as to achieve our ultimate goal of being a "Target Zero" organization where employees and contractors can come to work and return home safely every day.

3. Risk Factors

Due to technical and operational complexities in the petroleum exploration and production business, together with the need for a high volume of investment for new investment opportunities, exploration activities, project development activities, as well as production activities, PTTEP, therefore, places great importance on risk management by setting up a carefully considered Risk Governance Framework. This framework defines roles and responsibilities for personnel working at each level of authority, ranging from the Board of Directors, the management to the business units/functions to ensure that all risks are addressed, monitored and reported with management that is systematic and efficient.

In 2019, to achieve company goal, PTTEP placed importance on strategic risk management by defining a Risk Appetite Statement for clearly strategic formulation and selection to align with PTTEP's "Energy Partner of Choice" vision and "Operates globally to provide reliable energy supply" mission. Moreover, we established significant strategic risk assumption regular monitoring to prevent and reduce corporate strategic risk to promptly adjust strategies in keeping with rapidly changing situations. In addition, PTTEP is also reshaping the organization to enhance our competitiveness in the E&P business, which is our core business, while searching for opportunities in related businesses to invest in the near future. Key risk factors associated with our core business can be summarized as follows.

3.1 Strategic & Portfolio Risks

3.1.1 New Investment Risks

PTTEP continues to focus on E&P opportunities in Southeast Asia, particularly Malaysia, Myanmar and Sirikit Oil Field (S1 Project) in Thailand, that align with "Coming Home" company strategy, which is the area that the Company is familiar with. Moreover, PTTEP also seeks business opportunities in prolific petroleum areas with acceptable geopolitical risks and low costs of development and production. Certain risks and uncertainties must also be considered. These include political stability, energy policy changes, including laws and regulations.

The Company has drawn up plans to mitigate those risks which may potential affect our operations and investment growth, such as adopting strict due diligence within company investment risk limit including consideration of counterparty risks, recruiting proficient consultants, promoting understanding among stakeholders, proactively pursuing effective public relations, monitoring and providing opinions for appropriate decommissioning of equipment in areas related to technical aspects, regulatory requirements, economic feasibility as well as environmental and social impacts. In addition, we also regularly assess and analyze risks associated with climate change in relation to the business, as well as attempt to identify our "Low Carbon Footprint Reduction" roadmap, targets and action plans to manage the risks and their impacts. The Company works to manage effects from related risks such as the collection of carbon taxes in various countries that we operate in, and physical damage to our assets and construction structures caused by the rise in global temperature.

Investment in new countries or unfamiliar territories contains a number of inherent risks. The Company has therefore established risk mitigation guidelines for the assessment of each investment. The guidelines provide advice in various aspects, ranging from petroleum potential, size and project characteristics, acquisition procedures, additional reserves volumes, operator's capability and performance, attractiveness of the fiscal regime, geographical conditions, related laws and regulations, political stability, issues concerning international relations, economic conditions and financial stability. The risks are then taken into

account when preventive measures and options are formulated and integrated into a return-on-investment analysis or a joint venture agreement.

Investment in new projects, including farm-in and farm-out joint ventures, mergers and acquisitions, as well as withdrawal or divestment from any given project, must be intensively screened by the Investment Committee and the Management Committee. Their responsibility is to assess and ensure that each project adheres to the Company's investment direction and policy and that each project is economically and technologically feasible, and whether conventional or unconventional resources are involved, before proposing it to the Risk Management Committee prior to the final approval of the Board of Directors.

3.1.2 Organizational Capability Risks

Organizational capability is a key factor for the achievement of the Company's targets. Thus, business processes and human resources are, inevitably, of great importance. Potential risks include the risk from a lack of expertise and knowledge, and risk of business process inefficiency. In this regard, PTTEP has taken the following actions to enhance our business processes and organizational capability.

(1) Developing knowledge management is the company strategy's tool to collect, share and apply the valued knowledge to our operation that supports company sustainable growth and improve our staff competency to prepare the readiness to expand into new business opportunities. The Company plans and executes activities to drive the shared knowledge both from our staff within the Company and from the external expertise. In addition, new technologies and capability of the Company's research and development program are developed in line with our growth strategy to expand into new business opportunities. Our Capability and Technology Development Roadmap has been developed along with continuous research on technology to support business growth.

(2) Systems, procedures, and the organizational structure are improved and developed in line with PTTEP's growth strategy and business plan. These include work process improvement towards a matrix organization to maximize work efficiency, development of the Delegation of Authority and Signatures (DAS), as well as enhancement of the IT Global Platform, system stability and confidentiality control, e.g., adoption of cloud storage. In addition, the Company develops staff competency to align with our strategy and plans, e.g. arranging in-house training for staff, called Digital Academy training, to improve staff understanding for adaptation to agile work and establish DCOE (Digital Center of Excellence) to be the center for development of technology capability for our staff, such as Data Scientists and Data Engineers.

(3) To prepare for our investments in our core business and new business opportunities including smooth transition, the Company has devised Human Resources Development plans to recruit required and qualified staff members in operating and targeted countries. The plans focus on developing their capabilities and leadership, recruiting of external personnel in key positions that do not yet have in-house personnel, together with enhancing our employee engagement by targeting the Company to be ranked in Thailand's Top Quartile level in 2020. In addition, human resource improvement and our values and culture cultivation also ensure that development and growth of the Company are in line with PTT Group's goals.

3.2 Financial & Marketing Risks

3.2.1 Financial Risks

PTTEP determines an effective financial risk management policy with an emphasis on funding activities and liquidity management under an acceptable financial risk limit defined and regularly reviewed by the Risk Management Committee. The capital structure is also actively monitored to ensure the robustness of financial health to suit the current market environment and to support the Company's investment plans and execution in both the short term and the long term.

Major financial risks consist of counterparty risk and liquidity risks. For counterparty risk, it is PTTEP Group's policy that we conduct business transactions only with reputable, trusted and creditworthy counterparties. The financial stability and credibility of each counterparty must be analyzed and reviewed regularly. Currently, the majority of PTTEP Group's products are sold to PTT, which is our parent company.

For liquidity risks arising from the inability to maintain adequate working capital necessary for the operations, PTTEP Group has a policy to manage such risks by preparing appropriate cashflow forecasts and maintaining both committed and uncommitted credit facilities with financial institutions to support its working capital requirements.

3.2.2 Marketing and Distribution Risks

PTTEP has entered long-term gas sales agreements (GSAs) with PTT, which is the Company's major domestic buyer. The terms of the GSAs generally last 15 - 30 years. To mitigate market risks which can result in refusals from buyers to purchase contracted volumes of natural gas, GSAs stipulate obligations for the buyer and the seller to commit to the annual minimum volumes. Buyers must pay for the committed volumes of gas, whether or not the full amount is taken (Take-or-Pay).

To effectively cope with the dynamics of Thailand's energy demand, the Company closely monitors petroleum demand in coordination with PTT and related government agencies to collectively outline an optimized supply plan. The Company reviews and adjusts our production as well as project development plans regularly to ensure that the development master plan is able to optimize reserves and resources of existing assets to match the country's energy demand. We also have a project in Mozambique which possesses large natural gas reserves that can be developed as a Liquefied Natural Gas (LNG) project. This project is a good example of projects which fit in well with PTT's plan to import LNG as well as to contribute effectively to the enhancement of the energy security of Thailand.

3.2.3 Petroleum and Oil Price Risks

PTTEP Group's product prices depend on the world's crude oil prices, which are subject to multiple factors beyond our control, for example, the economic, political, and geopolitical stability of various countries (e.g., countries affected by sanctions from the United States of America), OPEC's production policy, capability and production plans of major oil producing countries (e.g., the United States of America, Russia), oil reserves in each country, and global climate change.

Fluctuations in the world's oil prices immediately affect the prices of PTTEP Group's crude oil and condensate. Yet, while natural gas prices tend to follow oil prices, most of PTTEP Group's contractual natural gas prices are adjusted every 3, 6, or 12 months, depending on the gas price formula of each project. As a result, natural gas prices are more stable than those of crude oil and condensate.

To reduce impacts from rising oil prices, PTTEP Group closely monitors oil prices and implemented an oil price hedging program with the objective of minimizing negative impacts on the Company's cash flow and operating performance.

3.2.4 Exchange Rate Risks

PTTEP Group adopts the U.S. Dollar (USD) as its functional currency in accordance with the International Financial Reporting Standards (IFRS) since the USD is the main currency used for trading PTTEP Group's major petroleum products, such as crude oil and natural gas. PTTEP Group's cash flows are, however, still exposed to USD/THB rate movement due to the settlement of USD-linked revenues being in THB. This is because a majority of PTTEP Group's trade customers are Thai entities; hence, revenue from USD-linked petroleum product is restricted to be paid in THB equivalent to USD only, while the Company's main cash outflows for investments and operating expenditures are mostly in USD. The currency mismatch and discrepancies between payables' and receivables' settlement periods as well as the USD/THB volatility therefore inevitably impose foreign exchange risk on our cash flows. Under this circumstance, PTTEP Group has minimized the foreign exchange risks by matching revenues and expenses cash flow in THB ("natural hedge") and employs applicable financial derivative instruments, such as forward and option contracts, to hedge the foreign-exchange exposure with reference to exchange rates in the sales agreements.

With USD as the functional currency, PTTEP Group is also exposed to the foreign-exchange translation risk arising from the translation of non-USD assets and liabilities at the end of every accounting period. To minimize such translation risk, PTTEP Group has consistently put in great efforts to maintain a proper balance between our non-USD assets and liabilities, mainly in THB. The Company also entered into cross-currency swaps on non-USD denominated obligations by converting both interests and principal payments to USD to reduce the impacts of exchange rate volatility.

3.2.5 Interest Rate Risks

PTTEP Group is exposed to interest rate risk as the risk affects future cash flows and fair values of the financial instruments employed. PTTEP Group eliminates and minimizes the risk by maintaining an appropriate debt portfolio optimization (ratio of fixed-rate liabilities and floating-rate liabilities) and using financial derivatives, such as interest rate swaps. Interest rate risk management is conducted dynamically, appropriately, and correspondingly to the nature of the business, the market conditions, relevant costs and the Company's acceptable risk limits.

3.3 Political and Legal/Regulatory Risks

3.3.1 Political Risks in Investment Countries

Based on PTTEP's foreign investment policy, we aim to invest in target areas of strategic significance in order to accommodate long-term growth. It is possible that such areas may be prone to geopolitical risks. Given this circumstance, PTTEP not only sets a certain level of acceptable risks in terms of politics, the economy, investment, laws and regulations but we also appoint a geopolitical risk team to closely follow the situations in countries and territories where PTTEP operates from internal sources. The team periodically produces analytical monthly reports on the developments regarding political stability, macroeconomic conditions, legal and regulatory aspects, and security across a range of investment countries. Thus far, two

areas, i.e. the Middle East and North Africa, have been identified as areas with significant geopolitical/country risks. Nevertheless, all projects in which PTTEP currently invests are situated remotely and have not experienced any negative impacts at all.

In addition, PTTEP incorporates both the assessment of geopolitical risks and country risks into an investment process and project management for further decision-making and preparation of contingent plans for management and related departments.

Results from the geopolitical risk and country risk analysis in our investment areas are used to formulate geopolitical risk rating scores which will be considered as part of the assessment process before making decisions whether to invest in new projects. In addition, PTTEP liaises closely with the Ministry of Foreign Affairs and Royal Thai Embassies in countries we invest to ensure that the Company's business operations are well-supported by relevant government agencies and that the projects are aligned with the respective national energy policies.

3.3.2 Compliance Risks

Generally, these risks can result from a variety of factors, such as complexity of specific laws, changes made to existing laws and regulations, misinterpretation of laws, or even nuances of the language in which the laws are written. The risks can potentially lead to certain actions or conduct that may be deemed incorrect, ultimately causing violation of or non-compliance with applicable laws which may then lead to pecuniary forms of punishment, such as fines and operational difficulties, potential revocation, suspension of licenses, and possible damage to PTTEP Group's reputation. To minimize these risks, the Governance, Compliance, and Internal Control Department is responsible for assuring that all of the business units strictly comply with their relevant laws, thereby building confidence among the Company's shareholders, Board of Directors, the management, and employees that we are in full compliance with laws relating to our business operations. In addition, PTTEP regularly monitors the legislation process to ensure that PTTEP's businesses comply with emerging laws.

PTTEP continued to focus on anti-corruption risks and monitoring programs. Details are disclosed in the "Corporate Governance" section, "Anti-Corruption" part.

In 2019, PTTEP monitored details of a new law, i.e. data privacy and cyber security, and communicated including arrangement of training sessions for related staff. Moreover, the Company developed another plan to ensure company compliance with related laws.

3.4 Operational Risks

3.4.1 Exploration Risks

Exploration activities are essential for the E&P business as they ensure that additional new petroleum reserves are found to replace those which have gone to production to generate the revenues, as well as to add new reserves to align with our strategy and support future production targets and growth.

The objective of exploration is to search for sizable petroleum resources for commercial development. The risks associated with exploration activities are geological risks and the uncertainty of finding a petroleum field of commercial size (Resources Volume Uncertainty).

Managing key exploration risks thus depends on the selection of exploration sites with good chances of finding sizable petroleum reserves that allow for commercial operations within an appropriate time and cost. The key factors that are

used to consider whether to invest in petroleum exploration include chance of success, resource estimation, exploration period and planned expenditures, thoroughness of geological studies, seismic acquisition and interpretation, exploration economic evaluation, and the terms of contracts.

PTTEP establishes clear processes and criteria in evaluating each step of the project, starting from potential petroleum basin evaluation and selection, in-depth subsurface studies of targeted blocks, and above-ground investment risks. The Geosciences and Exploration Group of PTTEP is tasked with formulating the exploration strategy and strategic plan based on exploration portfolio management, while allocating exploration budgets to high-potential blocks for further exploration activities. This process is reviewed and revised annually to ensure that the exploration strategies reflect and remain in line with the outcomes of the overall exploration activities and the agreement with the corporative targets.

In addition, the Company also stipulates that exploration studies need to pass the evaluation by the petroleum potential assessment review team to ensure that processes and results of various exploration project studies have covered the key issues. The assessment must also remain in line with certain criteria and standards as well as PTTEP's practices to ensure investment confidence and that the results of the exploration are in accordance with PTTEP's goals.

To align with company strategy, PTTEP define a policy to diversify exploration investment by setting the investment proportion in each site and diversifying it to another with partners who have site experience to extend the Company's exploration concept that support opportunity of achievement.

3.4.2 Project Development Risks

Following oil price fluctuations, PTTEP has continued to review the Company's development as well as cost control plans to meet targets. Development projects are part of the preparation for increasing reserves and production in the near future, such as those in the Mozambique Rovuma Offshore Area 1 Project and Algeria Hassi Bir Rekaiz Project. Meanwhile, for new projects with potential delays and cost overruns, the Company has implemented the following risk mitigation measures to ensure that they all remain on schedule.

(1) Project management: To safeguard against project delays and cost overruns, the Company focuses on related policy formulation, project management organization, project planning and engineering system designs, contract management, procurement, and construction monitoring.

(2) Personnel and process: To meet the targets set for safety, quality, budget, and timeline for project completion, the Company focuses on development of the team's skills which help us to better prepare for and protect ourselves when there is increased competition in the employment market for those with extensive skills and experience in the field. Information and experience-sharing from previous projects are also encouraged as part of all our project team skill development, while the Company's Project Realization Process (PREP) continues to actively seek out new approaches to fine-tune the operations so that targets are realized.

(3) Commercial contracts: To ensure maximum efficiency in minimizing the risks associated with non-contractual compliance and disputes while working with our contractors, the Company focuses on contract drafting, definitions of terms and conditions and contract administration. These risks can, however, be controlled by negotiations based on comprehensive competency, knowledge, and concerted efforts from various departments, such as those pertaining to construction, engineering, procurement, finance, accounting, and legal aspects. Prudent contract management also lessens

the risks and helps mitigate possible damage which could result from delays, potentially causing adverse effects on a given project and the Company's performance at large.

3.4.3 Production Risks

In every production process, PTTEP has to face various potential risks, starting from the production process at the bottom of the well until the point of sale. These risks include risk of well potential, production design flaws, damaged equipment, aging facilities, operation errors, and poor product quality, all of which can directly impact the corporate goals, production and sales targets.

Mitigation of production risks focuses on the areas of process planning and platform design, production control systems, and preventive maintenance. Operational Excellence Management System - Reliability & Asset Integrity, which is a part of the Operational Excellence Project, has been adopted and continuously improved to ensure the highest standards of production in terms of integrity and safety. The Asset Reliability & Integrity Management System (ARIMS) has been designed specifically to minimize production losses due to worn-out equipment and also to improve equipment efficiency through preventive maintenance and inspection, with the goal of achieving zero unplanned shutdowns. Meanwhile, work procedures, operation manuals, and extensive training programs have been improved, developed and adopted to instill greater understanding and efficiency among the Company's operating personnel.

The Company has also received ISO 22301 Business Continuity Management System (BCM) certification. The certified sites include Zawtika M-9 Production Operations and Business Support (Myanmar), Petroleum Development Support Base (Songkhla), and PTTEP Headquarters. BCM provides a formal plan that will keep effective and prompt business operation during disruptive period to provide confidence to for PTTEP's customers and stakeholders.

3.4.4 Safety, Security, Health and Environmental Risks

PTTEP has continued to analyze Safety, Security, Health and Environment (SSHE) risks to reduce the likelihood and impacts of unexpected events. The analysis comprises identification of internal and external factors. This helps to prevent major accidents as well as to reduce the risks that would affect PTTEP Group's employees and assets.

PTTEP has managed SSHE risks through the Company's SSHE Management System to set the SSHE policies, standards, guidelines and procedures for employees and contractors, so that they understand the implementation process and its objectives. This is in addition to fostering SSHE awareness in the corporate culture by providing training relating to safety and risk management to improve knowledge and performance as well as to keep the risks to the level as low as reasonably practicable (ALARP).

PTTEP has monitored SSHE Risk Management through the Company's Risk Management Committee at various levels and with a variety of key risk indicators and trackers, for example, Total Recordable Injury Rate, audit findings, close-out status, natural disasters, security status, and health infection in high risk countries, to ensure that all situations are being monitored to determine the suitable mitigation plans for improvement, correction, and prevention towards achieving even higher social and business sustainability.

3.4.5 Digital Security Threat Risks

Cybercrime frequently occurs and spreads across multiple business sectors through various channels, such as software vulnerability attacks, ransomware, and malware which can potentially lead to business disruption. PTTEP recognizes the importance of safeguarding against digital security threats and includes the risk of digital security threats in the Company's Corporate Risk Profile to closely monitor the development as well as to implement necessary measures.

Measures include upgrading the IT systems and antiviruses to detect security threats, conducting penetration tests to find network weaknesses and those networks in need of improvement, raising IT security awareness and understanding among the Company's staff through IT security e-learning programs, establishing a Security Operation Center (SOC) responsible for IT network surveillance, conducting Cyber Security Response Drills, regularly performing data backup and reviewing the disaster recovery plan. The results are subsequently reported to the Risk Management Committee and the Board of Directors respectively to ensure prompt responses to disruptive and emergency situations.

In 2019, the Cybersecurity Act was announced in addition to the Computer Crime Act 2007 and 2017. In this Act, there are rules and duties for government agencies and the Critical Information Infrastructure (CII), where PTTEP is a government agency under this law and its systems may also be classified as CII. However, the formal list of CII has not yet been announced. The duties required by this law include the preparation of a Code of Cybersecurity practices, prevention, response, and mitigation risks of cyber threats, including notification of names and contact information of administrative and operational staff to coordinate cybersecurity and reporting when a significant cyber threat occurs to the organization's systems.

PTTEP currently references the National Institute of Standards and Technology (NIST) as a standard framework for managing cybersecurity. Risk assessment has been carried out based on the ISO 27001:2013 standard for the electronic- mail system and data center facility since 2014, and has a risk assessment plan based on the ISO 27001:2013 standard for every system by 2020. There has been ongoing investment in tools and services from PTT Digital to prevent and respond to the risk of cyber threats, such as the Security Operations Center (SOC), which is in the process of connecting Security Information and Event Management (SIEM) and the network firewall for all production sites, expected to be completed by Q2' 2020, including a cyber-threat response exercise every year (e.g., Penetration Testing, Vulnerability Assessment, Cybersecurity Drill). PTTEP is confident of the readiness to participate in the test and report significant cyber threats to government agencies as required by law.

Currently PTTEP has a Company order about the appointment of executive officers to coordinate with government agencies regarding the Computer Crime Act 2007 and 2017, and is currently considering the appointment and notification of the list of management and operational officers for public agencies and infrastructure agencies.

3.5 Emerging Risks

In response to climate change and advanced technology that have recently disrupted today's business operations, PTTEP intends to improve strategic risk management for more efficient and prompt adjustment of our operations to support our sustainable growth.

3.5.1 Climate Change Risks

In view of extreme weather events and natural disasters pose more severe, coupled with the greenhouse effect, PTTEP, an exploration and production company, is well aware of risks from climate change and its possible impacts on our business operations in various aspects, namely (1) Operation: cyclones, floods, or phenomena caused by higher global temperatures, which can lead to disrupted operation or serious damage to the Company's production platforms or make exploration areas/production sites inaccessible, (2) Regulatory: such as emission pricing, carbon tax, or more stringent enforcement of climate change legislation depending on countries in which we operate, and (3) Market: trend towards more environmentally friendly forms of energy usage. The universal trend is towards more environmentally friendly forms of energy usage. At the 2015 United Nations Climate Change Conference (COP21) held in Paris, France, in December 2015, heads of state and governments around the world signed an agreement with the aim of reducing greenhouse gas emissions and substituting low-carbon fuels for typical fossil fuels. Thailand has also adopted a plan to reduce greenhouse gas emissions by 20 - 25% by 2030 (compared to the base year of 2015).

PTTEP realizes the significant of climate change management and managed to have the climate related risk management assessment for both existing projects and acquiring projects covering all those 3 aspects. PTTEP has established a risk management framework on climate change focusing on improving work processes to maximize energy efficiency, aiming for 5% reduction of energy intensity by 2020 and 25% reduction of greenhouse gas emissions by 2030 (compared to the base year of 2012). The Company has conducted reforestation activities to help increase the absorption of greenhouse gases as well as carbon offsetting through various mechanisms. Correspondingly, PTTEP has also engaged with the Thailand Greenhouse Gas Management Organization (TGO) to develop a set of activities, measures, and policies to reduce greenhouse gases under the Thailand Voluntary Emission Reduction (T-VER) project.

PTTEP's strategy on the new business opportunities emphasizes the gas value chain businesses including the "Gas to Power" project and Liquefied Natural Gas (LNG) project, as well as renewable energy opportunities which will also support transition to a low-carbon society.

3.5.2 Risks Arising from Disruptive Technology that Adversely Impacts Oil and Gas Industry

Technological advancement and renewable energy are playing an increasingly crucial role in the energy industry. They come in all forms, such as more reliable and efficient energy storage, battery-powered cars (Electric Vehicles), as well as other renewables and EV businesses whose production costs have plummeted over the years. Such disruptive technologies coupled with the government's policy regarding environmental issues with the intention of reducing greenhouse gas (GHG) emissions following the recent Paris Agreement on climate change as well as promotion of alternative-energy usage, such as the Alternative Energy Development Plan (AEDP) 2015 - 2036 that aims to increase the proportion of alternative-energy consumption in the forms of electricity, heat, or biofuel to 30% of the final stage of energy consumption in 2036, can cause tremendous damage to the energy industry. Oil demand has consequently been affected; some people may believe that days of the oil era are now numbered. This situation will be PTTEP's strategic risk that impacts our revenues from crude oil and condensate, which make up approximately 37% of the total revenues, including risk to our production cost advantages due to technology development by competitors.

In 2019, PTTEP modified business operations to align with advanced technology. The “ENTERPRISE” project will push the Company’s transformation, which involves the use of digital technologies and innovations as well as “Organizational Transformation” to remodel processes, allowing for more efficient and effective systems in order to become a lean organization with agile ways of working, resulting in reduced periods and costs of operation with lower uses of environmental resources together with environment preservation. The “ENTERPRISE” project also improves information management through digital transformation, e.g. establishing an integrated data platform, digitalization of 64 projects, and application of artificial intelligence (AI) or machine learning to assist production operation faster and more efficiently to increase our competitiveness and ready us for uncharted territory. For example, AI yields text analytics to analyze drilled wells in a shorter period that reduces costs and avoids inefficient production wells, AI is applied to set preventive maintenance plans to reduce the chance of equipment breakdown that impacts our revenue. The “ENTERPRISE” project assessment in five years will make up approximately five times the benefit of the investment thanks to reduced costs, increased revenue and improved operation efficiency, e.g. reduced development periods of production areas, early project development.

In addition, PTTEP has explored new business opportunities in order to enhance operational flexibility and competitiveness for sustainable growth by placing emphasis on three principal areas: (1) diversifying into other businesses in the oil and gas value chain, e.g., the “Gas to Power” project in Myanmar and Liquefied Natural Gas (LNG) (2) establishing a new subsidiary (AI and Robotics Ventures Co., Ltd.) in order to support future investments, such as being a service provider for activities using robotics and AI, predictive maintenance, and (3) renewable energies.

4. PTTEP and Our Subsidiaries' Assets

4.1 Property, Plant and Equipment

4.1.1 Oil and Gas Properties

PTTEP and our subsidiaries' properties are mainly jointly controlled oil and gas properties in each project. These properties comprise land, buildings, construction, machine and equipment, transportation pipeline, capitalized exploratory and production drilling costs, decommissioning costs, which are estimated by PTTEP Group's engineers and management's judgment, and acquisition costs of concession right, which shall incur when PTTEP and our subsidiaries acquire the concession right.

As at December 31, 2019, PTTEP and our subsidiaries' oil and gas properties are represented as share of the joint ventures' individual assets for each project as follows:

<u>PTTEP's joint ventures</u>	<u>Company's interest (%)</u>
Bongkot	66.6667
Arthit	80
Contract 4 (B12/27)	45
Sinphuhorm (E5 North)	20
S1	25
Contract 3 (B10, B11, B12 and B13)	5
E5	20
Algeria Hassi Bir Rekaiz	24.5
<u>PTTEPI's joint ventures</u>	<u>Company's interest (%)</u>
Yadana	25.5
Yetagun	19.31784
PTTEP 1	100
G4/43	21.375
G9/43	100
L22/43	100
L53/43 & L54/43	100
G4/48	5
Bongkot (G12/48)	66.6667
Contract 4 (G7/50) ¹	60
Arthit (G8/50)	80

¹ On September 10, 2019, PTTEP International Limited (PTTEPI), received the official approval from the Director General of the Department of Mineral Fuels to receive the transfer of the 10% participating interests in concessions blocks no. G7/50 from PTTEP G7 Limited (PTTEP G7). As a result, PTTEPI's participating interests in the concessions blocks no. G7/50 increased from 45% to 60%. The transaction is a business combination under a common control.

Zawtika	80
Myanmar M3	80
Myanmar M11 ²	100
MTJDA	50
<u>PTTEPO's joint venture</u>	<u>Company's interest (%)</u>
B8/32 & 9A ³	25.001
<u>PTTEP SV's joint venture</u>	<u>Company's interest (%)</u>
Vietnam 52/97	7
<u>PTTEP KV's joint venture</u>	<u>Company's interest (%)</u>
Vietnam B & 48/95	8.5
<u>PTTEP HL's joint venture</u>	<u>Company's interest (%)</u>
Vietnam 16-1	28.5
<u>PTTEP HV's joint venture</u>	<u>Company's interest (%)</u>
Vietnam 9-2	25
<u>PTTEP AG's joint venture</u>	<u>Company's interest (%)</u>
Algeria 433 a & 416 b	35
<u>PTTEPS's joint venture</u>	<u>Company's interest (%)</u>
Sinphuhorm (EU-1)	20
B6/27	100
S1	75
<u>PTTEP SA's joint venture</u>	<u>Company's interest (%)</u>
Myanmar MD-7	50
Myanmar MOGE 3 ⁴	77.5
<u>PTTEP CA's joint venture</u>	<u>Company's interest (%)</u>
Mariana Oil Sands	100

² On September 26, 2019, PTTEP International Limited (PTTEPI) submitted a request to terminate and return 100% of the exploration blocks of Myanmar M11 project after fulfillment of the requirements of the Production Sharing Contract. The termination will be effective after receiving the official approval from the Government of the Republic of the Union of Myanmar.

³ PTTEP Offshore Investment Company Limited (PTTEPO) has shareholding in Orange Energy Limited and B8/32 Partners Limited, which hold the project's concession.

⁴ On February 28, 2019, PTTEP South Asia Limited (PTTEP SA) received the official approval from the Government of the Republic of the Union of Myanmar to receive the transfer of the participating interests in Myanmar MOGE-3 project from other partners. As a result, its participating interests increased from 75% to 77.5% and PTTEP SA is the operator of the project.

<u>PTTEP AP's joint venture</u>	<u>Company's interest (%)</u>
PTTEP Australasia	
• AC/RL7, AC/RL12 and AC/P54	100
• AC/L3	100
• AC/RL10	90
• AC/RL4 (Tenacious)	100
• AC/RL6 (Audacious), AC/RL6 (exclusive of Audacious)	100
• AC/RL4 (exclusive of Tenacious), AC/RL5	100
<u>PTTEP MZA1's joint venture</u>	<u>Company's interest (%)</u>
Mozambique Area 1 ⁵	8.5
<u>Natuna's joint venture</u>	<u>Company's interest (%)</u>
Natuna Sea A	11.5
<u>PTTEP BL's joint venture</u>	<u>Company's interest (%)</u>
Barreirinhas AP 1	25
Brazil BM-ES-23	20
<u>PTTEP SP's joint venture</u>	<u>Company's interest (%)</u>
Contract 4 (B12/27)	15
Sinphuhorm (E5 North and EU-1)	35
<u>PTTEP G7's joint venture</u>	<u>Company's interest (%)</u>
Contract 4 (G7/50) ¹	-
<u>PTTEP HKO's joint venture</u>	<u>Company's interest (%)</u>
Sarawak SK410B	42.5
Sarawak SK417	80
Sarawak SK438	80
Peninsular PM407 ⁶	55
Peninsular PM415 ⁶	70
<u>PTTEP MEP's joint venture</u>	<u>Company's interest (%)</u>
Mexico Block 12 (2.4)	20
Mexico Block 29 (2.4)	16.67

⁵ Change project name from Mozambique Rovuma Offshore Area 1 to Mozambique Area 1

⁶ On March 21, 2019, PTTEP HK Offshore Limited (PTTEP HKO), a subsidiary of the Group, entered into the Production Sharing Contract to obtain the exploration and production rights of 2 offshore exploration blocks located in the coast of Peninsula, Malaysia, which are PM407 and PM415, in which PTTEP HKO holds 55% and 70% participating interests, respectively. PTTEP HKO is the operator of the 2 blocks.

<u>PTTEP ED's joint venture</u>	<u>Company's interest (%)</u>
G1/61 ⁷	60
G2/61 ⁷	100
<u>PTTEP MENA's joint venture</u>	<u>Company's interest (%)</u>
Abu Dhabi Offshore 1 ⁸	30
Abu Dhabi Offshore 2 ⁸	30
<u>PTTEP SBO's joint venture</u> ⁹	<u>Company's interest (%)</u>
Malaysia Block K	
● Kikeh	56
● SNP	22.4
● GK	6.366
Malaysia Block H	
● Rotan	56
● Others	42
<u>PTTEP SKO's joint venture</u> ⁹	<u>Company's interest (%)</u>
Sarawak SK314A	59.5
Sarawak SK405B	59.5
Sarawak SK309 and SK311	
● East Patricia	42
● Others	59.5

⁷ On February 25, 2019, PTTEP Energy Development Company Limited (PTTEP ED), a subsidiary of the Group, entered into the Production Sharing Contract and production rights of the exploration blocks G1/61 and G2/62, PTTEP ED holds 60% and 100% participating interests, respectively. PTTEP ED is the operator of the 2 blocks.

⁸ On January 12, 2019, PTTEP MENA Limited (PTTEP MENA), a subsidiary of the Group, and other partners signed the concession agreement to obtain the exploration and production rights of the exploration blocks Offshore 1 and Offshore 2 located on the northwestern coast of the Emirate of Abu Dhabi, the United Arab Emirates. PTTEP MENA holds 30% participating interests during the exploration period.

⁹ On March 21, 2019, PTTEP HK Offshore Limited (PTTEP HKO), a subsidiary of the Group, signed the Share Sale and Purchase Agreement (SPA) to acquire the 100% shareholding interests of Murphy Oil Corporation (Murphy) in Malaysia through acquisition of shares in Murphy's subsidiaries, which are Murphy Sabah Oil Co., Ltd. (Murphy Sabah) and Murphy Sarawak Oil Co., Ltd. (Murphy Sarawak). The acquisition was completed on July 10, 2019 as disclosed in Note 6 - Business acquisition Murphy Oil Corporation in Malaysia.

Partex Holding B.V. Group ¹⁰
Company's interest (%)

Angola Block 17/06	2.5
Potiguar	50
Dunga	20
PDO Block 6	2
Mukhaizna Block 53	1

As at December 31, 2019, details of properties' net book value are as follows:

Unit: Million USD

Details of properties	Historical cost	Accumulated depreciation	Allowance for impairment of assets	Net book value
Oil and Gas Properties	30,258.94	(19,937.02)	(329.88)	9,992.04
Exploration and Evaluation Assets	4,365.69	-	(1,726.20)	2,639.49
Goodwill	2,173.25	-	(112.39)	2,060.86
Pipeline and Others	1,283.47	(476.30)	(5.25)	801.92
Total	38,081.35	(20,413.32)	(2,173.72)	15,494.31

¹⁰ On June 17, 2019, PTTEP HK Holding Limited (PTTEP HK), a subsidiary of the Group, signed the Share Sale and Purchase Agreement (SPA) to acquire the 100% shareholding interests of Partex Holding B.V. (Partex). The acquisition was completed on November 4, 2019 as disclosed in Note 7 - Business acquisition Partex Holding B.V.

4.2 Investments

PTTEP has details of subsidiaries, associates, joint operations and joint ventures presented as follows:

Company name	Registered country	Type of business	Participating interest (%) (including indirect holding)	
			Dec 31, 2019	Dec 31, 2018
<u>Subsidiaries</u>				
1. PTTEP International Limited (PTTEPI)	Thailand	Petroleum	100	100
2. PTTEP Offshore Investment Company Limited (PTTEPO)	Cayman Islands	Petroleum	100	100
3. PTTEP Services Limited (PTTEP Services)	Thailand	Human resource support	100	100
4. PTTEP Siam Limited (PTTEPS)	Thailand	Petroleum	100	100
5. PTTEP HK Holding Limited (PTTEP HK)	Hong Kong	Petroleum	100	100
6. PTTEP Treasury Center Company Limited (PTTEP TC)	Thailand	Treasury center for the Group's business	100	100
7. PTTEP Energy Holding (Thailand) Company Limited (PTTEP EH)	Thailand	Petroleum	100	100
8. PTTEP Business Center Company Limited (PTTEP BC)	Thailand	Petroleum	100	100
9. PTTEP Energy Development Company Limited (PTTEP ED)	Thailand	Petroleum	100	100
10. EP-Tech Ventures Holding Company Limited (EP-Tech)	Thailand	Petroleum-related Technology	100	100
11. AI and Robotics Ventures Company Limited (ARV)	Thailand	Technology	100	100
12. PTTEP Southwest Vietnam Company Limited (PTTEP SV)	Cayman Islands	Petroleum	100	100
13. PTTEP Kim Long Vietnam Company Limited (PTTEP KV)	Cayman Islands	Petroleum	100	100
14. PTTEP Hoang-Long Company Limited (PTTEP HL)	Cayman Islands	Petroleum	100	100
15. PTTEP Hoan-Vu Company Limited (PTTEP HV)	Cayman Islands	Petroleum	100	100
16. PTTEP Algeria Company Limited (PTTEP AG)	Cayman Islands	Petroleum	100	100
17. PTTEP Holding Company Limited (PTTEPH)	Cayman Islands	Petroleum	100	100
18. PTTEP Indonesia Company Limited (PTTEP ID)	Cayman Islands	Petroleum	100	100
19. PTTEP Africa Investment Limited (PTTEP AI)	Cayman Islands	Petroleum	100	100
20. PTTEP Australia Pty Ltd (PTTEP AU)	Commonwealth of Australia	Petroleum	100	100
21. PTTEP Australia Offshore Pty Ltd (PTTEP AO)	Commonwealth of Australia	Petroleum	100	100
22. PTTEP South Asia Limited (PTTEP SA)	Cayman Islands	Petroleum	100	100
23. PTTEP Semai II Limited (PTTEP SM)	Cayman Islands	Petroleum	100	100

Company name	Registered country	Type of business	Participating interest (%) (including indirect holding)	
			Dec 31, 2019	Dec 31, 2018
<u>Subsidiaries</u> (continued)				
24. PTTEP Australia Perth Pty Ltd (PTTEP AP)	Commonwealth of Australia	Petroleum	100	100
25. PTTEP Australia Browse Basin Pty Ltd (PTTEP AB)	Commonwealth of Australia	Petroleum	100	100
26. PTTEP Australia Timor Sea Pty Ltd (PTTEP AT)	Commonwealth of Australia	Petroleum	100	100
27. PTTEP Australasia (Operations) Pty Ltd (PTTEP AAO)	Commonwealth of Australia	Petroleum	100	100
28. PTTEP Australasia (Ashmore Cartier) Pty Ltd (PTTEP AAA)	Commonwealth of Australia	Petroleum	100	100
29. PTTEP Australasia (Staff) Pty Ltd (PTTEP AAS)	Commonwealth of Australia	Petroleum	100	100
30. PTTEP International Holding Company Limited (PTTEP IH)	Cayman Islands	Petroleum	100	100
31. PTTEP Southwest Vietnam Pipeline Company Limited (PTTEP SVPC)	Cayman Islands	Gas pipeline transportation	100	100
32. PTTEP FLNG Holding Company Limited (PTTEP FH) ¹	Hong Kong	Petroleum	100	100
33. PTTEP Netherland Holding Limited (PTTEP NL)	Cayman Islands	Petroleum	100	100
34. JV Marine Limited (JV Marine)	Cayman Islands	Petroleum	100	100
35. PTTEP South Mandar Limited (PTTEP SMD)	Cayman Islands	Petroleum	100	100
36. PTTEP South Sageri Limited (PTTEP SS)	Cayman Islands	Petroleum	100	100
37. PTTEP Sadang Limited (PTTEP SD)	Cayman Islands	Petroleum	100	100
38. PTTEP Malunda Limited (PTTEP ML)	Cayman Islands	Petroleum	100	100
39. PTTEP Netherlands Coöperatie U.A. (PTTEP NC)	Netherlands	Petroleum	100	100
40. PTTEP Canada Limited (PTTEP CA)	Canada	Petroleum	100	100
41. PTTEP Canada International Finance Limited (PTTEP CIF)	Canada	Investment funding for the Group's business	100	100

¹ On August 24, 2017, the Company approved for the registration for the dissolution of PTTEP FLNG Holding Company Limited (PTTEP FH). It is currently in the process of the dissolution.

Company name	Registered country	Type of business	Participating interest (%) (including indirect holding)	
			Dec 31, 2019	Dec 31, 2018
<u>Subsidiaries</u> (continued)				
42. Cove Energy Limited (Cove)	United Kingdom of Great Britain and Northern Ireland	Petroleum	100	100
43. Cove Energy Mozambique Rovuma Onshore Limited (CEMROL) ¹	Republic of Cyprus	Petroleum	100	100
44. Cove Energy East Africa Limited (CEEAL)	Republic of Cyprus	Petroleum	100	100
45. PTTEP Mozambique Area 1 Limited (PTTEP MZA1)	Republic of Cyprus	Petroleum	100	100
46. Cove Energy Kenya Limited (CEKL) ²	Republic of Kenya	Petroleum	100	100
47. PTTEP Netherlands Holding Coöperatie U.A. (PTTEP NH)	Netherlands	Petroleum	100	100
48. PTTEP Brazil Investment B.V. (PTTEP BI)	Netherlands	Petroleum	100	100
49. PTTEP Brazil Investments in Oil and Gas Exploration and Production Limitada (PTTEP BL)	Federative Republic of Brazil	Petroleum	100	100
50. Sinphuhorm Holdings Limited (SHL)	Cayman Islands	Petroleum	100	100
51. PTTEP SP Limited (PTTEP SP)	United Kingdom of Great Britain and Northern Ireland	Petroleum	100	100
52. PTTEP G7 Limited (PTTEP G7)	Thailand	Petroleum	100	100
53. PTTEP HK Offshore Limited (PTTEP HKO)	Hong Kong	Petroleum	100	100
54. PTTEP MENA Limited (PTTEP MENA)	Hong Kong	Petroleum	100	100
55. PTTEP Mexico E&P Limited, S.de R.L. de C.V. (PTTEP MEP)	Mexico	Petroleum	100	100
56. PTTEP Sabah Oil Limited (PTTEP SBO) ³	Bahamas	Petroleum	100	-
57. PTTEP Sarawak Oil Limited (PTTEP SKO) ⁴	Bahamas	Petroleum	100	-

¹ On May 22, 2017, the Company approved for the registration for the dissolution of Cove Energy Mozambique Rovuma Onshore Limited (CEMROL). It is currently in the process of the dissolution.

² On May 22, 2017, the Company approved for the registration for the dissolution of Cove Energy Kenya Limited (CEKL). It is currently in the process of the dissolution.

³ On July 10, 2019, PTTEP HK Offshore Limited (PTTEP HKO), a subsidiary of the Group, acquired the 100% shareholding interests of Murphy Sabah Oil Co., Ltd. (Murphy Sabah) and Murphy Sarawak Oil Co., Ltd. (Murphy Sarawak) as disclosed in Note 6 - Business acquisition Murphy Oil Corporation in Malaysia and change the name to PTTEP Sabah Oil Limited (PTTEP SBO) and PTTEP Sarawak Oil Limited (PTTEP SKO) respectively.

Company name	Registered country	Type of business	Participating interest (%) (including indirect holding)	
			Dec 31, 2019	Dec 31, 2018
<u>Subsidiaries</u> (continued)				
58. Partex Holding B.V. (PHBV) ⁴	Netherlands	Petroleum	100	-
59. Partex Oil and Gas (Holdings) Corporation (POGHC) ⁵	Cayman Islands	Petroleum	100	-
60. Partex (Kazakhstan) Corporation (PKC) ⁵	Cayman Islands	Petroleum	100	-
61. Partex (Angola) Corporation (PANG) ⁵	Cayman Islands	Petroleum	100	-
62. Partex (Brazil) Corporation (PBC) ⁵	Cayman Islands	Petroleum	100	-
63. Partex Gas Corporation (PGC) ⁵	Republic of Panama	Petroleum	100	-
64. Partex Services Corporation (PSC) ⁵	Republic of Panama	Petroleum	100	-
65. Participations and Explorations Corporation (PEC) ⁵	Republic of Panama	Petroleum	100	-
66. Partex (Oman) Corporation (POC) ⁵	Republic of Panama	Petroleum	100	-
67. Partex Services Portugal – Serviços para a Indústria Petrolífera, S.A. (PSP) ⁵	Portugal	Petroleum	100	-
68. Partex Brasil Ltda. (PBL) ⁵	Brazil	Petroleum	100	-
69. Partex Brasil Operações Petrolíferas Ltda (PBO) ⁵	Brazil	Human resource support	100	-
<u>Associates</u> ⁵				
1. Energy Complex Company Limited (Energy Complex)	Thailand	Property rental services	50	50
2. PTT Digital Solutions Company Limited (PTT Digital)	Thailand	Information technology and communication services	20	20
3. PTTEP AP Group’s Associates ⁶	Commonwealth of Australia	Air base services	50	50
4. PTT Global LNG Company Limited (PTT GL)	Thailand	Petroleum	50	50
5. Leismer Aerodrome Limited (LAL)	Canada	Air transportation	32	32

⁴ On November 4, 2019, PTTEP HK Holding Limited (PTTEP HK), a subsidiary of the Group, acquired the 100% shareholding interests of Partex Holding B.V. as disclosed in Note 7 - Business acquisition Partex Holding B.V.

⁵ All investments in associates have been assessed as immaterial to the Group.

⁶ PTTEP AP's group associates are Mungalalu Truscott Airbase Pty Ltd and Troughton Island Pty Ltd.

Company name	Registered country	Type of business	Participating interest (%) (including indirect holding)	
			Dec 31, 2019	Dec 31, 2018
<u>Joint Ventures</u> ¹				
1. Erawan 2 FSO Bahamas Limited (Erawan 2) ²	Bahamas	FSO rental services	13.11	13.11
2. APICO LLC ³	United States	Petroleum	72.8215	-
3. Oman LNG LLC (OLNG) ⁴	Oman	Petroleum	2	-
<u>Joint Operations</u>				
1. Carigali – PTTEPI Operating Company Sdn Bhd. (CPOC)	Malaysia	Petroleum	50	50
2. Moattama Gas Transportation Company (MGTC)	Bermuda	Gas pipeline transportation	25.5	25.5
3. Taninthayi Pipeline Company LLC (TPC)	Cayman Islands	Gas pipeline transportation	19.3178	19.3178
4. Orange Energy Limited (Orange)	Thailand	Petroleum	53.9496	53.9496
5. B8/32 Partners Limited (B8/32 Partners)	Thailand	Petroleum	25.0009	25.0009
6. Hoang-Long Joint Operating Company	Socialist Republic of Vietnam	Petroleum	28.5	28.5
7. Hoan-Vu Joint Operating Company	Socialist Republic of Vietnam	Petroleum	25	25
8. Groupement Bir Seba (GBRS)	People's Democratic Republic of Algeria	Petroleum	35	35
9. Andaman Transportation Limited (ATL)	Cayman Islands	Gas pipeline transportation	80	80
10. Natuna 2 B.V. (Natuna)	Netherlands	Petroleum	50	50

¹ All investments in joint ventures have been assessed as immaterial to the Group.

² Erawan 2 has a 100% shareholding in Asia Pacific Marine Services (EF) B.V.

³ On June 4, 2019, PTTEP SP Limited (PTTEP SP), a subsidiary of the Group, acquired participating interests in APICO LLC as disclosed in Note 19.6 Events during the Accounting Period.

On September 11, 2019, PTTEP HK Holding Limited (PTTEP HK), a subsidiary of the Group, acquired participating interests in APICO LLC as disclosed in Note 19.6 Events during the Accounting Period.

⁴ On November 4, 2019, PTTEP HK Holding Limited (PTTEP HK), a subsidiary of the Group, acquired participating interests in Partex Holding B.V. as disclosed in Note 7 Business acquisition Partex Holding B.V.

Company name	Registered country	Type of business	Participating interest (%) (including indirect holding)	
			Dec 31, 2019	Dec 31, 2018
Joint Operations (continued)				
11. Petroleum Development Oman LLC (PDO) ⁵	Oman	Petroleum	2	-
12. Abu Dhabi Gas Industries Limited (AGP) ¹²	The United Arab Emirates	Petroleum	2	-
13. Private Oil Holdings Oman Limited (POHOL) ¹²	United Kingdom of Great Britain and Northern Ireland	Petroleum	5	-

4.3 Net Book Value

As at December 31, 2019, PTTEP's net book value amounted to 11,841 MMUSD (equivalent to 357,059 MMTHB) or USD 2.98 per share (equivalent to THB 89.94 per share).

⁵ On November 4, 2019, PTTEP HK Holding Limited (PTTEP HK), a subsidiary of the Group, acquired participating interests in Partex Holding B.V. as disclosed in Note 7 Business acquisition Partex Holding B.V.

5. Legal Dispute

As of December 31, 2019, the outstanding legal dispute in which PTTEP or one of the Company's subsidiaries is a party involved as well as a dispute that can significantly affect our operation or the subsidiary's operation, excluding disputes from the normal operation and circumstance, is as follows:

5.1 PTTEP Australasia (Ashmore Cartier) Pty Ltd ("PTTEP AAA") was sued for damages in the Federal Court of Australia by a group of Indonesian seaweed farmers.

On August 3, 2016, a group of Indonesian seaweed farmers filed a lawsuit against PTTEP AAA in the Federal Court of Australia, claiming damages caused by 2009 Montara incident in Australia. The lawsuit was filed after the lapse of the period of prescription for claims. However, on November 15, 2017, the Federal Court of Australia granted an extension of the limitation period due to certain legal exceptions. As of December 31, 2019, the case was still under court proceeding. This lawsuit did not state the amount of claim.

PTTEP and PTTEP AAA continue to maintain the position, based on independent scientific research overseen by the Australian Government, that no spilled oil from Montara reached the shores of Australia or Indonesia, that there is no lasting impact on the ecosystems and biodiversity in Australian waters in the areas immediate to Indonesian waters, and that there is no long-term damage to the environment in the Timor Sea.

6. General Information and Other Significant Information**6.1 Information of PTTEP**

Company Name	PTT Exploration and Production Public Company Limited or PTTEP
Headquarters Address	555/1 Energy Complex Building A, 6 th and 19 th - 36 th Floor, Vibhavadi Rangsit Road, Chatuchak, Bangkok 10900, Thailand
Type of Business	Exploration and production of petroleum and investments in related businesses
Registration Number	0107535000206
Telephone	+66-2537-4000
Facsimile	+66-2537-4444
Website	www.pttep.com
E-mail	Independent Directors: independentdirector@pttep.com Investor Relations: ir@pttep.com Corporate Secretary: corporatesecretary@pttep.com
Registered Capital	3,969,985,400 ordinary shares with THB 1 per share (THB 3,969,985,400)
Paid-Up Capital	3,969,985,400 ordinary shares with THB 1 per share (THB 3,969,985,400) as of December 31, 2019

6.2 Subsidiaries and Associated Companies Information

• Subsidiaries Information ¹

As of December 31, 2019, there were 81 subsidiaries which have the same contact address, telephone and facsimile numbers as PTTEP as in 6.1. Details of the directors designated by the PTTEP Group for each subsidiary are disclosed in Attachment 2 as follows:

No.	Company Name	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding	
E&P and Related Businesses						
1	PTTEP Australia Pty Ltd	PTTEP AU	50,000	Ordinary Share	PTTEPH	100%
2	PTTEP Australia Offshore Pty Ltd	PTTEP AO	50,000	Ordinary Share	PTTEP AU	100%
3	PTTEP Australia Perth Pty Ltd	PTTEP AP	50,000	Ordinary Share	PTTEPH	100%
4	PTTEP Australia Browse Basin Pty Ltd	PTTEP AB	50,000	Ordinary Share	PTTEP AP	100%
5	PTTEP Australasia (Staff) Pty Ltd	PTTEP AAS	10	Ordinary Share	PTTEP AB	100%
6	PTTEP Australasia (Ashmore Cartier) Pty Ltd	PTTEP AAA	1,700,000	Ordinary Share	PTTEP AB	100%
7	PTTEP Australasia (Operations) Pty Ltd	PTTEP AAO	106,686,517	Ordinary Share	PTTEP AB	100%
8	PTTEP Australia Timor Sea Pty Ltd	PTTEP AT	50	Ordinary Share	PTTEP AB	100%
9	PTTEP Sabah Oil Limited	PTTEP SBO	10,000	Ordinary Share	PTTEP HK	100%
10	PTTEP Sarawak Oil Limited	PTTEP SKO	10,000	Ordinary Share	PTTEP HK	100%
11	PTTEP Brasil Investimentos Em Exploração e Produção de Petróleo e Gás Ltda.	PTTEP BL	790,293,700	Ordinary Share	PTTEP BI PTTEP NH	99.9999999% 0.0000001%
12	Partex Brasil Ltda.	PBL	20,008,638 506,611	Ordinary Share	PBC PEC	97.53% 2.47%
13	Partex Brasil Operações Petrolíferas Ltda.	PBO	349,000 1,000	Ordinary Share	PBC PEC	99.71% 0.29%
14	PTTEP Canada Limited	PTTEP CA	3,014,946,540	Ordinary Share	PTTEP NC	100%

¹ Notification of the Securities and Exchange Commission No. Kor Chor. 17/2551, Re: Determination of Definitions in Notifications relating to Issuance and Offer for Sale of Securities

No.	Company Name	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding	
15	Cove Energy East Africa Limited	CEEAL	1,000	Ordinary Share	COVE	100%
16	Cove Energy Mozambique Rovuma Onshore Limited	CEMROL	1,000	Ordinary Share	CEEAL	100%
17	PTTEP Mozambique Area 1 Limited	PTTEP MZA1	1,000	Ordinary Share	CEEAL	100%
18	PTTEP FLNG Holding Company Limited	PTTEP FH	10,000	Ordinary Share	PTTEP IH	100%
19	PTTEP HK Holding Limited	PTTEP HK	10,000	Ordinary Share Ordinary Share	PTTEP PTTEPI	25% 75%
20	PTTEP HK Offshore Limited	PTTEP HKO	10,000	Ordinary Share	PTTEP HK	100%
21	PTTEP MENA Limited	PTTEP MENA	500	Ordinary Share	PTTEP BC	100%
22	Cove Energy Kenya Limited ²	CEKL	1,000	Ordinary Share Ordinary Share	CEEAL COVE	99.9% 0.1%
23	PTTEP Offshore Investment Company Limited	PTTEPO	6,667	Ordinary Share Ordinary Share	PTTEP PTTEPI	75% 25%
24	PTTEP Holding Company Limited	PTTEPH	50,000	Ordinary Share	PTTEPO	100%
25	Sinphuhorm Holdings Limited	SHL	100	Ordinary Share	PTTEPO	100%
26	PTTEP International Holding Company Limited	PTTEP IH	50,000	Ordinary Share	PTTEPH	100%
27	PTTEP Africa Investment Limited	PTTEP AI	50,000	Ordinary Share	PTTEPH	100%
28	JV Marine Limited	JV Marine	50,000	Ordinary Share	PTTEP IH	100%
29	PTTEP Netherland Holding Limited	PTTEP NL	50,000	Ordinary Share	PTTEP IH	100%
30	PTTEP Indonesia Company Limited	PTTEP ID	50,000	Ordinary Share	PTTEPH	100%
31	PTTEP Sadang Limited	PTTEP SD	50,000	Ordinary Share	PTTEP ID	100%
32	PTTEP Semai II Limited	PTTEP SM	50,000	Ordinary Share	PTTEP ID	100%
33	PTTEP South Mandar Limited	PTTEP SMD	50,000	Ordinary Share	PTTEP ID	100%
34	PTTEP South Sageri Limited	PTTEP SS	50,000	Ordinary Share	PTTEP ID	100%

² In liquidation process

No.	Company Name	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding	
35	PTTEP Malunda Limited	PTTEP ML	50,000	Ordinary Share	PTTEP ID	100%
36	PTTEP Algeria Company Limited	PTTEP AG	50,000	Ordinary Share	PTTEPO	100%
37	PTTEP Hoang-Long Company Limited	PTTEP HL	50,000	Ordinary Share	PTTEPO	100%
38	PTTEP Hoan-Vu Company Limited	PTTEP HV	50,000	Ordinary Share	PTTEPO	100%
39	PTTEP Kim Long Vietnam Company Limited	PTTEP KV	50,000	Ordinary Share	PTTEPO	100%
40	PTTEP Southwest Vietnam Company Limited	PTTEP SV	50,000	Ordinary Share	PTTEPO	100%
41	PTTEP South Asia Limited	PTTEP SA	50,000	Ordinary Share	PTTEPH	100%
42	Partex (Brazil) Corporation	PBC	50,000	Ordinary Share	PHBV	100%
43	Partex (Kazakhstan) Corporation	PKC	500	Ordinary Share	PHBV	100%
44	Partex (Angola) Corporation	PANG	50,000	Ordinary Share	PHBV	100%
45	Partex Oil and Gas (Holdings) Corporation ³	POGHC	50,000	Ordinary Share	PHBV	100%
46	PTTEP Mexico E&P Limited, S. de R.L. de C.V.	PTTEP MEP	3,000	Ordinary Share	PTTEP HK	99%
				Ordinary Share	PTTEP HKO	1%
47	Carigali-PTTEPI Operating Company SDN BHD	CPOC	350,000	Ordinary Share	PTTEPI	50%
48	PTTEP Netherlands Coöperatie U.A.	PTTEP NC	-	-	PTTEP IH	0.00005%
					PTTEP NL	99.99995%
49	PTTEP Netherlands Holding Coöperatie U.A.	PTTEP NH	-	-	PTTEP HK	75%
					PTTEPI	25%
50	PTTEP Brazil Investment B.V.	PTTEP BI	50,000	Ordinary Share	PTTEP NH	100%
51	Natuna 2 B.V.	Natuna	90,000	Ordinary Share	PTTEP NH	50%
52	Partex Holding B.V.	PHBV	100,000	Ordinary Share	PTTEP HK	100%
53	Participations and Explorations Corporation	PEC	2,500	Ordinary Share	PHBV	100%
54	Partex (Oman) Corporation	POC	2,500	Ordinary Share	PHBV	100%

³ Dormant Company

No.	Company Name	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding	
55	Partex Gas Corporation	PGC	2,000,000	Ordinary Share	PHBV	100%
56	Partex Services Corporation	PSC	3,000	Ordinary Share	PHBV	100%
57	Partex Services Portugal – Serviços para a Indústria Petrolífera, S.A.	PSP	50,000	Ordinary Share	PHBV	100%
58	PTTEP International Limited	PTTEPI	2,000,000,000	Ordinary Share	PTTEP	100%
59	PTTEP Siam Limited	PTTEPS	1,000,000	Ordinary Share	PTTEP	51%
				Ordinary Share	PTTEPO	49%
60	Orange Energy Limited	ORANGE	1,000,000	Ordinary Share	PTTEPO	53.95%
					MOECO B.V.	36.05%
					KrisEnergy	10%
61	PTTEP G7 Limited	PTTEP G7	8,030,741	Ordinary Share	PTTEPI	100%
62	PTTEP Energy Holding (Thailand) Company Limited	PTTEP EH	87,579,936	Ordinary Share	PTTEP	100%
63	PTTEP Energy Development Company Limited	PTTEP ED	24,055,000	Ordinary Share	PTTEP EH	100%
64	EP-Tech Ventures Holding Company Limited	EP-Tech	310,000	Ordinary Share	PTTEP EH	100%
65	Apico (Khorat) Limited	APICO KL	5,845,168	Ordinary Share	APICO KH	100%
66	Cove Energy Limited	Cove	63,840,000	Ordinary Share	PTTEP AI	100%
67	PTTEP SP Limited	PTTEP SP	2	Ordinary Share	SHL	100%
			61,279,585			
68	APICO LLC	APICO	338,278	Ordinary Share	PTTEP SP	33.83%
			389,937		PTTEP HK	38.99%
69	APICO (Khorat) Holdings LLC	APICO KH	-	Ordinary Share	APICO	100%
Service Business						
70	PTTEP Services Limited (Personnel services support)	PTTEP Services	1,000,000	Ordinary Share	PTTEP	25%
					PTTEPI	75%
71	Andaman Transportation Limited (Investments in gas pipeline projects in Myanmar)	ATL	62,500	Ordinary Share	PTTEPO	80%
					MOGE	20%

No.	Company Name	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding	
72	PTTEP Southwest Vietnam Pipeline Company Limited (Investments in gas pipeline projects in Vietnam)	PTTEP SVPC	50,000	Ordinary Share	PTTEPH	100%
73	PTTEP Canada International Finance Limited (Raise fund for PTTEP business)	PTTEP CIF	50,000	Ordinary Share	PTTEP NC	100%
74	PTTEP Treasury Center Company Limited (Treasury center for PTTEP and subsidiaries)	PTTEP TC	10,000,000	Ordinary Share	PTTEP PTTEPI	25% 75%
75	PTTEP Business Center Company Limited (Business center for PTTEP and subsidiaries)	PTTEP BC	573,386,860	Ordinary Share	PTTEP EH	100%
Other Business						
76	AI and Robotics Ventures Company Limited (Research and Development and providing service for AI and Robotics)	ARV	300,000	Ordinary Share	EP-Tech	100%
77	Energy Complex Company Limited (Property Leasing)	EnCo	180,000,000	Ordinary Share	PTTEP	50%
78	PTT Global LNG Company Limited (Investment in LNG Business)	PTTGL	10,421,446,000	Ordinary Share	PTTEP BC	50%
79	PTTGL Investment Limited (Investment in LNG Business)	PTTGLI	309,825,000	Ordinary Share	PTTGL	100%
80	Mungalalu Truscott Airbase Pty Ltd (Air Base Operations)	MTA	600	Ordinary Share	PTTEP AAO	50%
81	Troughton Island Pty Ltd (Secondary)	TTI	100	Ordinary Share	PTTEP AAO	50%

• **Associated Companies' Information⁴**

As of December 31, 2019, PTTEP had 20 associated companies. Details of the directors designated by the PTTEP Group for each associated company are disclosed in Attachment.

No.	Company Name	Type of Business	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding
1	PTT Digital Solutions Company Limited	Information Technology and Communication Services	PTT Digital	15,000,000	Ordinary Share	PTTEP 20%
	Head Office: 555/1 Energy Complex					
	Building A, 4 th -5 th Floor, Vibhavadi Rangsit Road, Chatuchak, Bangkok 10900, Thailand					
	Telephone: +66-2537-3456					
	Facsimile: +66-2537-2935					
2	B8/32 Partners Limited	Petroleum Exploration and Production	B 8/32 Partners	110,000	Ordinary Share	PTTEPO 25%
	Head Office: 19 Siam Commercial Bank Park Plaza, East 3 rd Building, 5 th Floor, Ratchadaphisek Road, Chatuchak, Bangkok 10900, Thailand					
	Telephone: +66-2545-5555					
	Facsimile: -					
3	Sarn Palung Social Enterprise Company Limited	Social Enterprise	SPSE	1,000,000	Ordinary Share	PTTEP 15%
	Head Office: 555/1 Energy Complex					
	Building A, 10 th Floor, Vibhavadi Rangsit Road, Chatuchak, Bangkok 10900, Thailand					
	Telephone: +66-2537-2971					
	Facsimile: -					

⁴ Notification of the Securities and Exchange Commission No. Kor Chor. 17/2551, Re: Determination of Definitions in Notifications relating to Issuance and Offer for Sale of Securities

No.	Company Name	Type of Business	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding
4	Moattama Gas Transportation Company	Gas Pipeline in Myanmar	MGTC	1,000,000	Ordinary Share	PTTEPO 25.5%
	Head Office: No. 5 Sacred Tooth Relic Lake Avenue, Punh Pin Gone Quarter No. 5, Mayangon Township, Yangon, Myanmar					
	Telephone: +95-1-650-977, 660-466					
	Facsimile: +95-1-650-478, 650-479					
5	Taninthayi Pipeline Company LLC	Gas Pipeline in Myanmar	TPC	100,000	Ordinary Share	PTTEPO 19.31784%
	Head Office: 16 Shwe Taung Kyar Bahan, Yangon, Myanmar					
	Telephone: +95-1-526-411-4					
	Facsimile: +95-1-525-698					
6	Hoang Long Joint Operating Company	Petroleum Exploration and Production	HL JOC	- ⁵	-	PTTEP HL 28.5%
	Head Office: Suite 2001, Me Linh Point Tower, 2 Ngo Duc Ke Street, District 1, Ho Chi Mihn City, S.R. Vietnam					
	Telephone: +84-8-3829-9359					
	Facsimile: +84-8-3822-6106					
7	Hoan-Vu Joint Operating Company	Petroleum Exploration and Production	HV JOC	- ⁶	-	PTTEP HV 25%
	Head Office: Suite 2006, Me Linh Point Tower, 2 Ngo Duc Ke Street, District 1, Ho Chi Mihn City, S.R. Vietnam					
	Telephone: +84-8-3823-9525					
	Facsimile: +84-8-3823-9526					

⁵ No share was issued. Percentage of shareholding is subject to participation interest in the concession.

⁶ No share was issued. Percentage of shareholding is subject to participation interest in the concession.

No.	Company Name	Type of Business	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding
8	Groupeement Bir Seba	Petroleum Exploration and Production	GBRS	- ⁷	-	PTTEP AG 35%
	Head Office: Zone d'activité Route Nationale N°3 BP 256 EURO JAPAN Hassi Messaoud, Ouargla, Algeria					
	Telephone: +213-29-79-71-66					
	Facsimile: +213-29-79-09-15					
9	Leismer Aerodrome Limited	Air Base Operations	LAL	200	Ordinary Share	PTTEP CA 32%
	Head Office: 1200, 215 – 9 th Avenue SW Calgary, AB T2P 1K3, Canada					
	Telephone: +1-403-237-8227					
	Facsimile: +1-403-264-4640					
10	MOZ LNG1 Holding Company Ltd.	Petroleum Exploration and Production	MOZ LNG1 Holding	1,000,000	Ordinary Share	PTTEP MZA1 8.5%
	Head Office: 3412 ResCo-work08, 34, Al Maqam Tower, Abu Dhabi Global Market Square, Al Maryah Island, Abu Dhabi, United Arab Emirates					
	Telephone: -					
	Facsimile: -					
11	MOZ LNG1 Financing Company Ltd.	Petroleum Exploration and Production	MOZ LNG1 Financing	100	Ordinary Share	MOZ LNG1 Holding 100%
	Head Office: 3510, 35 th Floor, A1 Maqam Tower, ADGM Square, A1 Maryah Island, Abu Dhabi, United Arab Emirates					
	Telephone: -					
	Facsimile: -					

⁷ No share was issued. Percentage of shareholding is subject to participation interest in the concession.

No.	Company Name	Type of Business	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding
12	Mozambique LNG 1 Company Pte. Ltd.	Petroleum Exploration and Production	MZ LNG1	2,500	Ordinary Share	MOZ LNG1 Holding 100%
	Head Office: 50 Raffles Place #60-00 Singapore Land Tower, Singapore 048623					
	Telephone: -					
	Facsimile: -					
13	Erawan 2 FSO Bahamas Ltd.	Lease of FSO (vessel)	Erawan 2 FSO Bahamas	100	Ordinary Share	JV Marine 13.11%
	Head Office: Ocean Center, Montagu Foreshore, East Bay Street, Nassau, New Providence, Bahamas P.O. Box SS-19084					
	Telephone: -					
	Facsimile: -					
14	Asia Pacific Marine Services (EF) B.V.	Lease of FSO (vessel)	Asia Pacific Marine Services	18,000	Ordinary Share	Erawan 2 FSO 100%
	Head Office: Naritaweg 165, Telestone 8, 1043 BW Amsterdam, The Netherlands					
	Telephone: -					
	Facsimile: -					
15	PETRONAS LNG 9 SDN. BHD.	LNG Liquefaction Plant	PL9SB	39,563	Ordinary Share	PTTGLI 10%
	Head Office: Tower 1, PETRONAS Twin Towers, Kuala Lumpur City Centre, 50088 Kuala Lumpur, Malaysia					
	Telephone: +60-320-515-000					
	Facsimile: -					

No.	Company Name	Type of Business	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding
16	Private Oil Holdings Oman Limited	Holding of participating interests in oil and gas	POHOL	649,152	Ordinary Share	POC 5%
	Head Office: 8 York Road, London, England, SE1 7NA					
	Telephone: -					
	Facsimile: -					
17	Petroleum Development Oman LLC	Petroleum Exploration and Production	PDO	1,720	Ordinary Share	POHOL 2%
	Head Office: Mina A1 Fahal, Muscat, The Sultanate of Oman					
	Telephone: +968 24678111					
	Facsimile: Telex: 5212, Petro ON Cable: Petro Muscat					
18	Oman LNG LLC	LNG Facility	OLNG	1,209,877	Ordinary Share	POC 2%
	Head Office: Ghala, P.O. Box 560, C.P.O, P.C. 116 The Sultanate of Oman					
	Telephone: +968-24609999					
	Facsimile: +968-24625406					
19	QALAHAT LNG SAOC	LNG Facility	QLNG	1,795,000	Ordinary Share	OLNG 0.736%
	Head Office: Al Arfan Street. Gala Industrial Area – P.O. Box: 3395, P. C: 111 99 Street, Airport Heights, Ghala, Baushar, The Sultanate of Oman					
	Telephone: +968-24625400					
	Facsimile: +968-24625406					

No.	Company Name	Type of Business	Abbreviation	Number of Shares Sold		Total Direct/Indirect Holding
20	Abu Dhabi Gas Industries Limited	Gas Processing Facility	AGP	8,000	Ordinary Share	PGC 2%
	Head Office: P.O. Box 665, Abu Dhabi, UAE					
	Telephone: +971 2 7070000					
	Facsimile: +971 2 6023389					

6.3 References

1) Share Registrar

1.1)	Name	Thailand Securities Depository Company Limited
	Address	93, Ratchadaphisek Road, Dindaeng, Bangkok 10400, Thailand
	Telephone	SET Contact Center: +66-2009-9999
	Website	http://www.set.or.th/tsd

2) Registrar and Paying Agent

- 2.1) Registrar and paying agent for THB 5,000 million subordinated perpetual capital debentures issued in June 2012.

Name	TMB Bank Public Company Limited
Address	Floor 5A, 3000 Phahon Yothin Road, Chatuchak, Bangkok 10900, Thailand
Telephone	+66-2299-1824, +66-2299-1825
Facsimile	+66-2242-3270

- 2.2) Registrar and paying agent for THB 11,400 million debentures issued in June 2014, and THB 15,000 million debentures issued in June 2019.

Name	Siam Commercial Bank Public Company Limited
Address	14 th Floor, Zone A, 9 Ratchadaphisek Road, Chatuchak, Bangkok 10900, Thailand
Telephone	+66-2795-4153
Facsimile	+66-2544-7475

3) Debenture Holders' Representative

- 3.1) Debenture holders' representative for THB 5,000 million subordinated perpetual capital debentures issued in June 2012.

Name	Siam Commercial Bank Public Company Limited
Address	14 th Floor, Zone A, 9 Ratchadaphisek Road, Chatuchak, Bangkok 10900, Thailand
Telephone	+66-2795-4153
Facsimile	+66-2544-7475

4) Trustee

- 4.1) Trustee for outstanding USD 700 million debentures issued in April 2011, outstanding USD 30 million subordinated perpetual capital debentures issued in July 2017, outstanding USD 650 million debentures issued in December 2019.

Name BNY Mellon Corporate Trust
Address #04-01 Millenia Tower, 1 Temasek Avenue, Singapore 039192
Telephone +65-6432-0351, +65-6432-4036
Facsimile +65-6883-0338

- 4.2) Trustee for outstanding USD 490 million debentures issued in June 2012.

Name Citicorp International Limited
Address 20th Floor, Citi Tower, One Bay East, 83 Hoi Bun Road, Kwun Tong, Hong Kong
Telephone +852-2868-7964
Facsimile +852-2323-0279

5) Registrar and Paying Agent

- 5.1) Registrar and paying agent for bills of exchange with a total revolving credit of up to THB 50,000 million.

Name TMB Bank Public Company Limited
Address Floor 5A, 3000 Phahonyothin Road, Chom Phon, Chatuchak,
Bangkok 10900, Thailand
Telephone +66-2299-1824, +66-2299-1825
Facsimile +66-2242-3270

6) Facility Agent

- 6.1) Facility agent for USD 600 million loan agreement dated in June 2019.

Name DBS Bank Ltd.
Address 2 Changi Business Park Crescent, DBS Asia Hub Lobby B #04-06,
Singapore 486029
Telephone +65 6682 0041, +65 6878 7650
Facsimile +65 6324 4427

7) Process Agent for Bank Loan

- 7.1) Process agent for USD 600 million loan agreement dated in June 2019.

Name Law Debenture Corporate Services Limited
Address 801 2nd Avenue, Suite 403, New York, NY 10017, USA
Telephone +1-212-750-6474
Facsimile +1-212-883-0630

8) Process Agent for Common Shares

8.1) **Name** CT Corporation System
 Address 28 Liberty Street New York, New York 10005, USA
 Telephone +1-212-894-8800
 Facsimile -

9) Cross Currency Swap Counterparties

9.1) **Name** Siam Commercial Bank Public Company Limited
 Division Financial Market Division
 Address 12th Floor, Zone B, 9 Ratchadaphisek Road, Chatuchak, Bangkok 10900, Thailand
 Telephone +66-2544-5741-9
 Facsimile +66-2937-7968

9.2) **Name** The Hongkong and Shanghai Banking Corporation Limited, Bangkok Branch
 Division Global Markets
 Address HSBC Building, 968 Rama IV Road, Silom, Bangrak, Bangkok 10500, Thailand
 Telephone +66-2614-4000
 Facsimile +66-2353-7333

10) FX Contracts Counterparties

10.1) **Name** Kasikornbank Public Company Limited
 Division Capital Markets Business Division
 Address 400/22 Phahon Yothin Avenue, Samsen-Nai, Phayathai, Bangkok 10400, Thailand
 Telephone +66-2470-3006
 Facsimile +66-2271-4486

10.2) **Name** Krung Thai Bank Public Company Limited
 Division Corporate Sales, Global Markets Group
 Address Building 1 (Nana Nua), 8th Floor, 35 Sukhumvit Road, Klongtoey Nua, Wattana, Bangkok 10110, Thailand
 Telephone +66-2208-4644
 Facsimile +66-2256-8398

10.3) **Name** Siam Commercial Bank Public Company Limited
 Division Financial Market Division
 Address 12th Floor, Zone B, 9 Ratchadaphisek Road, Chatuchak, Bangkok 10900, Thailand
 Telephone +66-2544-5741-9
 Facsimile +66-2937-7969

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| 10.4) | Name | Bank of America, National Association (Bangkok Branch) |
| | Division | Fixed Income Currencies and Commodities (FICC) Sales |
| | Address | 87/2 All Seasons Place, CRC Tower, 20 th Floor,
Wireless Road, Lumpini, Pathum Wan, Bangkok 10330, Thailand |
| | Telephone | +66-2305-2988, +66-2305-2986 |
| | Facsimile | +66-2685-3224 |
| 10.5) | Name | Citibank, N.A. (Thailand) |
| | Division | Corporate Sales & Structuring Thailand |
| | Address | Interchange 21 Building, 399 Sukhumvit Road, Klongtoey Nua, Wattana,
Bangkok 10110, Thailand |
| | Telephone | +66-2788-2785 |
| | Facsimile | +66-2788-4825-8 |
| 10.6) | Name | CIMB Thai Bank Public Company Limited |
| | Division | Global Sales, Treasury Sales Division |
| | Address | 44 Langsuan Road, Lumpini, Pathumwan, Bangkok 10330, Thailand |
| | Telephone | +66-2670-4623, +66-2670-4658 |
| | Facsimile | +66-2657-3282-3 |
| 10.7) | Name | Bank of Ayudhya Public Company Limited |
| | Division | Sales & Trading Division Global Markets Group |
| | Address | 550 Ploenchit Road, Lumpini, Pathumwan, Bangkok 10330, Thailand |
| | Telephone | +66-2021-6380-1, +66-2021-6385, +66-2021-6207 |
| | Facsimile | +66-2296-6908 |
| 10.8) | Name | Bangkok Bank Public Company Limited |
| | Division | Treasury Division |
| | Address | 333 Silom Road, Silom, Bangrak, Bangkok 10500, Thailand |
| | Telephone | +66-2021-1111 |
| | Facsimile | +66-2636-4633 |
| 10.9) | Name | TMB Bank Public Company Limited |
| | Division | Capital Markets |
| | Address | 3000 Phahon Yothin Road, Chatuchak, Bangkok 10900, Thailand |
| | Telephone | +66-2676-8008 |
| | Facsimile | +66-2292-4690-2 |

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| 10.10) | Name | Deutsche Bank AG, Bangkok Branch |
| | Division | Corporate Treasury Sales |
| | Address | 63 Athenee Tower, 27 th -29 th Floor, Wireless Road, Lumpini,
Pathum Wan, Bangkok 10330, Thailand |
| | Telephone | +66-2646-5139 |
| | Facsimile | +66-2651-5892 |
| 10.11) | Name | BNP Paribas Bangkok Branch |
| | Division | Global Markets, FXLM Sales Corporate |
| | Address | 990 Abdulrahim Place, 29 th Floor, Rama IV Road, Silom, Bangrak,
Bangkok 10500, Thailand |
| | Telephone | +66-2659-8990 |
| | Facsimile | +66-2636-1929 |
| 10.12) | Name | United Overseas Bank (Thai) Public Company Limited |
| | Division | Global Markets |
| | Address | 191 South Sathon Road, Yannawa, Sathorn, Bangkok 10120, Thailand |
| | Telephone | +66-2343-4381-4 |
| | Facsimile | +66-2285-1365 |
| 10.13) | Name | J.P. Morgan Chase Bank N.A. |
| | Division | Global Emerging Markets |
| | Address | 20 Bubbajit Building, 2 nd Floor, North Sathon Road, Silom, Bangrak,
Bangkok 10500, Thailand |
| | Telephone | +66-2684-2247 |
| | Facsimile | +66-2684-2260 |
| 10.14) | Name | ANZ Bank (Thai) Public Company Limited |
| | Division | Corporate Sales |
| | Address | 63 Athenee Tower, 8 th Floor, Unit 801-806, Wireless Road, Lumpini,
Pathumwan, Bangkok, 10330, Thailand |
| | Telephone | +66-2263-9722 |
| | Facsimile | +66-2263-9700 |

11) Auditor

11.1)	Name	State Audit Office of the Kingdom of Thailand
	Address	Soi Areesampan, Rama VI Road, Phayathai, Bangkok 10400, Thailand
	Telephone	+66-2271-8025
	Facsimile	+66-2618-5800

12) Legal Advisors

12.1)	Name	Linklaters (Thailand) Ltd.
	Address	20 th Floor, Capital Tower, All Seasons Place, 87/1, Wireless Road, Bangkok 10330, Thailand
	Telephone	+66-2305-8000
	Facsimile	+66-2305-8010
12.2)	Name	Weerawong, Chinnavat & Partners Ltd.
	Address	22 nd Floor, Mercury Tower 540, Phloen Chit Road, Lumpini, Pathumwan, Bangkok 10330, Thailand
	Telephone	+66-2264-8000
	Facsimile	+66-2657-2222
12.3)	Name	Siam Premier International Law Office Limited
	Address	26 th Floor, The Offices of Central World, 999/9 Rama I Road, Pathumwan, Bangkok 10330, Thailand
	Telephone	+66-2646-1888
	Facsimile	+66-2646-1919
12.4)	Name	Allen & Overy (Thailand) Co., Ltd.
	Address	23 rd Floor, Sindhorn Building 3 130 – 132, Wireless Road, Lumpini, Pathumwan, Bangkok 10330, Thailand
	Telephone	+66-2263-7600
	Facsimile	+66-2653-7699
12.5)	Name	Herbert Smith Freehills (Thailand) Limited
	Address	1403 Abdulrahim Place, 990 Rama IV Road, Silom, Bangrak, Bangkok 10500, Thailand
	Telephone	+66-2657-3888
	Facsimile	+66-2636-0657

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| 12.6) | Name | Baker & McKenzie Abogados, S.C. |
| | Address | Edificio Virreyes, Pedregal 24, Piso 12,
Lomas Virreyes / Col. Molino del Rey
México City, 11040 Mexico |
| | Telephone | +52-55-5279-2900 |
| | Facsimile | +52-55-5279-2999 |
| 12.7) | Name | Clifford Chance |
| | Address | 27 th Floor, Jardine House, One Connaught Place,
Hong Kong, Hong Kong (SAR) |
| | Telephone | +852-2825-8888 |
| | Facsimile | +852-2825-8800 |
| 12.8) | Name | Jones Day |
| | Address | 138 Market Street, Level 28 Capita Green, Singapore 048946 |
| | Telephone | +65-6538-3939 |
| | Facsimile | +65-6538-3939 |
| 12.9) | Name | King & Spalding (Singapore) LLP |
| | Address | 1 Raffles Quay, #31-01 North Tower, Singapore 048583 |
| | Telephone | +65-6303-6000 |
| | Facsimile | +65-6303-6000 |
| 12.10) | Name | Shearman & Sterling LLP |
| | Address | 6 Battery Road #25-03, Singapore 049909 |
| | Telephone | +65-6230-3800 |
| | Facsimile | +65-6230-3899 |
| 12.11) | Name | Slaughter and May |
| | Address | One Bunhill Row, London EC1Y8YY, UK |
| | Telephone | +4420-7600-1200 |
| | Facsimile | +4420-7090-5000 |
| 12.12) | Name | Trowers & Hamblins LLP |
| | Address | Office 902, Floor 9, Tower C1, Al Bateen Towers,
King Abdullah Bin Abdulaziz Al Saud St,
P.O. Box 37021, Abu Dhabi, United Arab Emirates |
| | Telephone | +971-2410-7600 |
| | Facsimile | +971-2410-7601 |
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13) Advisor to the Board of Directors

13.1) Name	Mr. Tongchat Hongladarom
Address	8 Room 8/48 Prasanmit Condominium, Sukhumvit 23, Klongtoey Nua, Wattana, Bangkok 10110, Thailand
Telephone	+66-2258-4363
Facsimile	+66-2258-4363

6.4 Other Significant Information

- None -