



ENERGY PARTNER OF CHOICE

SUSTAINABILITY REPORT
2019

ENERGY PARTNER OF CHOICE

Sustainable Value

For 35 years, our explorer spirit has driven us beyond energy security, for we must also deliver value to society, communities, and the environment. To us, sustainability means that the growth of our business goes hand in hand with all our stakeholders.



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Partner of Everyone’s Choice

Beyond our commitment and responsibility to green exploration and production, we strive to deliver opportunities and a decent quality of life for society and communities and to cultivate joint environmental stewardship. That way, we will prove our worth as a partner of choice.

*E&P - Exploration and Production

Message from the President and Chief Executive Officer



Throughout 35 years, PTTEP has been engaged in oil and gas exploration and production activities to serve social and economic development while protecting and conserving the environment. Although oil and gas are prime sources of energy in today's world, increasing concerns about adverse impacts from their operations are prominent; for example greenhouse gas emissions, resource efficiency, and potential spills to the environment. Other additional issues including global oil prices, growth in renewable energy, emerging technology and technological innovations are also becoming threats to oil and gas activities.

To overcome these challenges, PTTEP aims to deliver growth and create long-term value to all stakeholders while transforming ourself to the challenging environment and drive the company to strong and sustainable growth.

These commitments are very well demonstrated in our vision to become an "Energy Partner of Choice".

We fully recognize that we cannot be viewed simply as a profit-seeking entity. Instead, an important element of our

strategy is to incorporate social and environmental concerns into our business activities to ensure the sustainability of the organization.

Sustainability can be defined under different perspectives. PTTEP's core philosophy of Sustainable Development is based on balancing of the business growth, environmental stewardship and social development. The philosophy is driven by our Sustainable Development framework which is based on the key aspects of High Performance Organization (HPO) to drive efficiency throughout our value chain, Governance, Risk Management and Compliance (GRC) for effective governance in the organization and Stakeholder Value Creation (SVC) as part of our commitment to create long-term value for all stakeholders. Sometimes we refer to this framework as "Be Smart, Be Good, and Be Responsible". Sustainable Development is, therefore, not only our goal, but it is also the way we think and act in pursuit of our vision.

PTTEP performance in 2019 was relatively satisfactory across various aspects, with a number of actions still ongoing. In terms of business, the company has achieved our targets

under the “Expand and Execute” Strategy. In Thailand, PTTEP signed Production Sharing Contract (PSC) for Bongkot and Erawan fields allowing PTTEP to become the largest domestic gas supplier from 2020 awards. Internationally, the company expanded our business in strategic areas through acquisitions, such as, Murphy Oil Corporation in Malaysia and Partex Holding B.V. with the main investment in the Middle East. Furthermore, PTTEP discovered a large natural gas field in Sarawak SK410B project in Malaysia, as well as achieved Final Investment Decision (FID) for operating projects in Mozambique and Algeria. The results of such successes mean the company achieved the highest average sales volume at 350,651 barrels of oil equivalent per day with the proportion of natural gas sales at 71% and expected continued growth in the next 5 years (2020 - 2024). As a result, proved reserves at the end of 2019 were at 1,140 million barrels of oil equivalent and proved reserves to production ratio was at 7.5 years as targeted. Moreover, the company targeted to increase the proportion of natural gas production at 80% of all production to cope with the energy transition which is predicted to have a significant impact to the oil and gas industry.

In addition, in response to the rapid changes through our ENTERPRISE* Project, PTTEP has continuously focused on the transformation of the organization, work processes, organizational culture as well as the digital transformation to strengthen cost competitiveness, improve work efficiency and to sustain in the rapid changes of the upcoming future.

PTTEP also moved forward to grasp new business opportunities throughout our value chain in the oil and gas business, including investments in the natural gas value chain, such as the Gas-to-Power project in the Republic of the Union of Myanmar and in new business sectors, including robotics and Artificial Intelligence (AI), predictive maintenance and inspection, and renewable energy.

At PTTEP, we work to ensure a zero-accident workplace to achieve our aspiration of Target Zero. We seek to create an open and inclusive safety culture where our employees and contractors are empowered to “Stop Work” any time they believe it is unsafe to continue. Through our commitment to personal and process safety, our safety statistics have significantly decreased and ranked in the top quartile compared to the average performance in the International Association of Oil and Gas Producers (IOGP). In addition, our continuous efforts on the environment have led us to receive awards for climate change and water programs

from CDP, a not-for-profit organization for the global disclosure of environmental impacts.

Apart from the “Expand and Execute” business strategy, PTTEP also highlighted three additional strategies to drive the company towards sustainable growth in all aspects. Those strategies included: “Greenhouse Gas Reduction” in response to global concern of global warming and climate change, “Circular Model for E&P**” to cope with issues related to resource efficiency and waste management, and “Ocean for Life” to respond to global ocean issues on pollution and natural conservation. Our corporate strategies were developed in alignment to our stakeholder expectations and in support of the United Nations Sustainable Development Goals (UN SDGs). Long-term targets (2030) and their significant achievements were highlighted in this report.

With our continuous efforts and commitment to a sustainable future, in 2019, PTTEP was once again selected as a member of the 2019 Dow Jones Sustainability Indices (DJSI) in the DJSI World Oil and Gas Upstream & Integrated Industry for the sixth consecutive year. The company was also ranked the Industry Leader in this category for the second time. The first time was in 2016. Domestically, PTTEP received the 2019 SET Award in Best Sustainability Award from The Stock Exchange of Thailand (SET), and the NACC Integrity Award from the National Anti-Corruption Commission (NACC). This recognition reflects our commitment and determination to sustainable value creation for our stakeholders.

PTTEP adheres to the ten principles of the United Nations Global Compact (UNGC) at Advanced Level principles. Additionally, over the past years, PTTEP has been driving the Thai business sectors towards sustainability through various collaboration platforms, together with other organizations in Thailand, such as, the Global Compact Network Thailand (GCNT), Thai Business Council of Sustainable Development (TBCSD), and Thailand Responsible Business Network (TRBN).

Last but not least, I would like to thank our shareholders, business partners, contractors, suppliers, related government agencies, communities, as well as, our management and employees for their continued support and contribution to our journey towards sustainability.

I believe that together we all are part of the move towards a sustainable future.

* ENTERPRISE is a project to transform the organization, work processes, and corporate culture.

** E&P - Exploration and Production

Over Three Decades on Sustainable Development Path

PTTEP first started as the petroleum exploration and production arm of the Petroleum Authority of Thailand (PTT), with the mission to ensure Thailand's energy sustainability. It remained so until PTTEP was established as PTT Exploration and Production Company on June 20, 1985.



1985

PTTEP Establishment

PTTEP has transferred technology from world-class Exploration and Production (E&P) companies. We continued to gather experience, knowledge, and expertise until the day we ventured out of the country in 1989 to commence operations in the Republic of the Union of Myanmar. Currently, we have operated over 40 projects in nearly all continents.



2015

UNGC
Advanced Level



2019

Member of the 2018
Dow Jones
Sustainability Indices
(DJSI) in the World
Oil and Gas Upstream
& Integrated Industry
for the sixth consecutive
year and the second
time as Industry Leader

From the very beginning, PTTEP, a Thai E&P* company, has executed every operational activities in line with internationally accepted standards. Also, PTTEP has taken social and environmental aspects into our consideration while pursuing our business goals.

* E&P - Exploration and Production

Looking back on our first days of operation, PTTEP developed the idea of sustainability from day one. Since establishment in 1985, we aimed to be a “Green Organization” with emphasis on environmental management. Later, we have applied the United Nations’ sustainable development principles that cover the areas of economic, social, and environment as well as several other international sustainability assessment criteria, including the Dow Jones Sustainability Indices (DJSI), to formulate the organization’s sustainability management framework.

In 2011, PTTEP became an Active Participant of the United Nations Global Compact (UNGC) which reflected our commitment to adhere to the UNGC’s ten principles. The aim of the initiative was to gain cooperation from all parties in the improvement of human rights, labour, environment, and anti-corruption practices. The company has been at Advanced Level

since 2015, indicating our compliance to UNGC’s most-stringent criteria.

Over the years, PTTEP has been committed to transparent operations with equitable and fair treatment to all stakeholders, good governance, business ethics and adherence to the UN’s Universal Declaration of Human Rights. PTTEP has also regularly raised employee awareness on compliance through our PTTEP good corporate governance and business ethics.

For over three decades, we have been proud of our commitment to energy security and sustainability. We are aware of the importance of all stakeholders and the responsibility to improve the well-being of communities and society and environmental conservation. Therefore, PTTEP gives importance to the formulation of a sustainability framework and strategies that will support business growth and create long-term values for all stakeholders.



From “We” to “World”, to Become a Sustainable Organization and the Pride of Thailand

In 2018, PTTEP introduced a new vision to become the “Energy Partner of Choice” and conducted a review on our Sustainable Development framework in accordance with the new vision. The framework comprises of three main components namely: High Performance Organization (HPO) or “Be Smart”, Governance, Risk Management and Compliance (GRC) or “Be Good”, and Stakeholder Value Creation (SVC) or “Be Responsible”. The balance of these three components will support PTTEP’s journey towards sustainability. The framework corresponds

with our “EP SPIRIT” corporate values; Explorer, Passion, Synergy, Performance Excellence, Innovation, Responsibility for Society, Integrity and Ethics, and Trust and Respect.

Operating under the Sustainable Development framework, PTTEP is confident that this strong foundation as well as conscious consideration of all stakeholders’ interests will enable us to maintain energy security, deliver value, and foster sustainability for the wider world.





From “We” to “World”



HPO High Performance Organization

- Put in place international standard work processes and continuous improvement in work efficiency
- Constantly inspire the development of innovation and technology
- Emphasize human resources development
- Focus on safety, security, occupational health, and environmental management

GRC Governance, Risk Management and Compliance

- Be committed to proper, transparent, and fair business operations
- Strictly comply with laws and regulations
- Adhere to Good Corporate Governance and Business Ethics principles and appropriate risk management

SVC Stakeholder Value Creation

- Be conscious of all stakeholders' expectations
- Create long-term sustainable value in response to stakeholders' expectations

Under our Sustainable Development framework, PTTEP has developed clear and concrete strategies to support our journey towards sustainability.

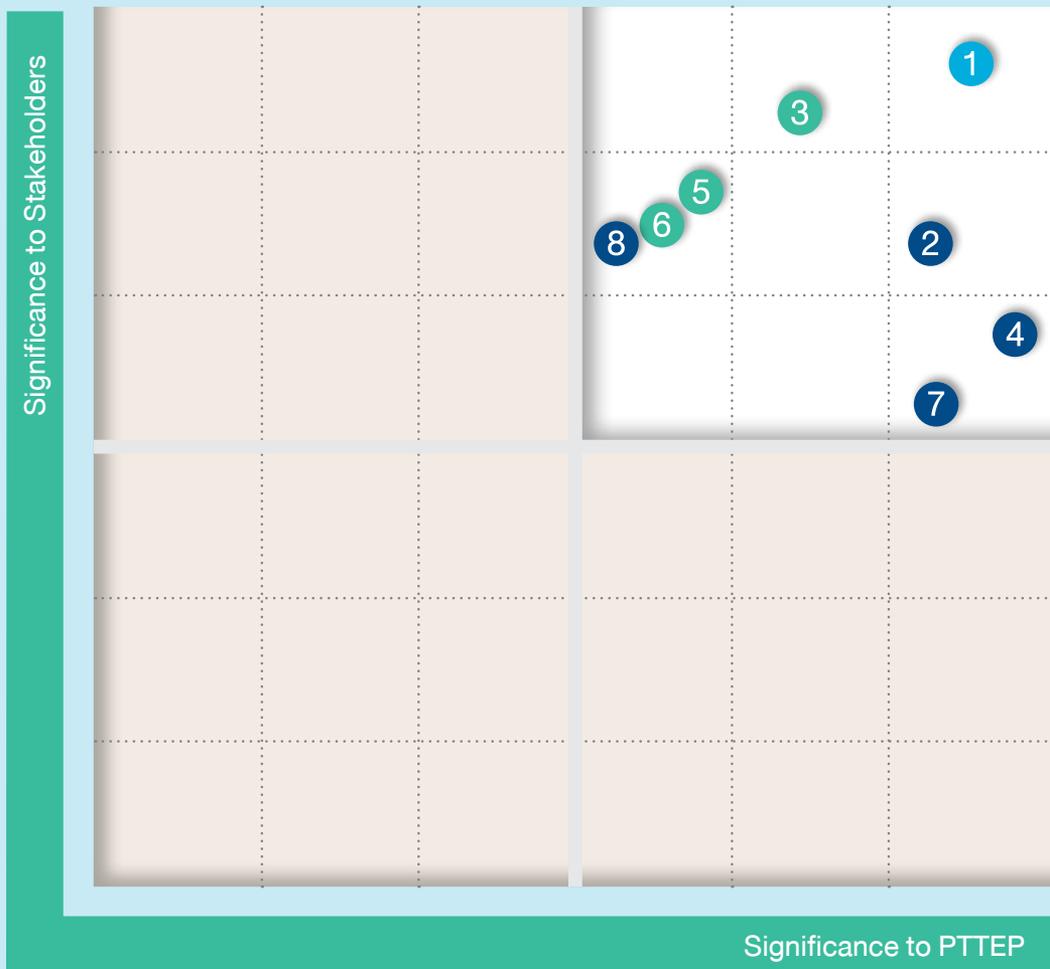
Our Sustainable Development

In 2019, PTTEP developed the sustainability strategy following the Sustainable Development framework and strived to respect all stakeholders, namely government agencies, shareholders, financial institutions, joint venture partners, suppliers and customers, business partners, society and communities, as well as employees and executives. We are open to their opinions, expectations, and perspectives that concern material issues to identify opportunities and risks that must be addressed and prepared for future challenges.

The stakeholders' perspectives and views were then prioritized and linked to issues that support the company objectives. The results of the materiality assessment are as follows:



The Results of the Materiality Assessment in 2019



HPO
High Performance Organization

- 2 Increasing Petroleum Reserves
- 4 Human Resource Preparation
- 7 Technology and Innovation
- 8 Occupational Health and Safety

GRC
Governance, Risk Management and Compliance

- 1 Governance, Risk Management and Compliance

SVC
Stakeholder Value Creation

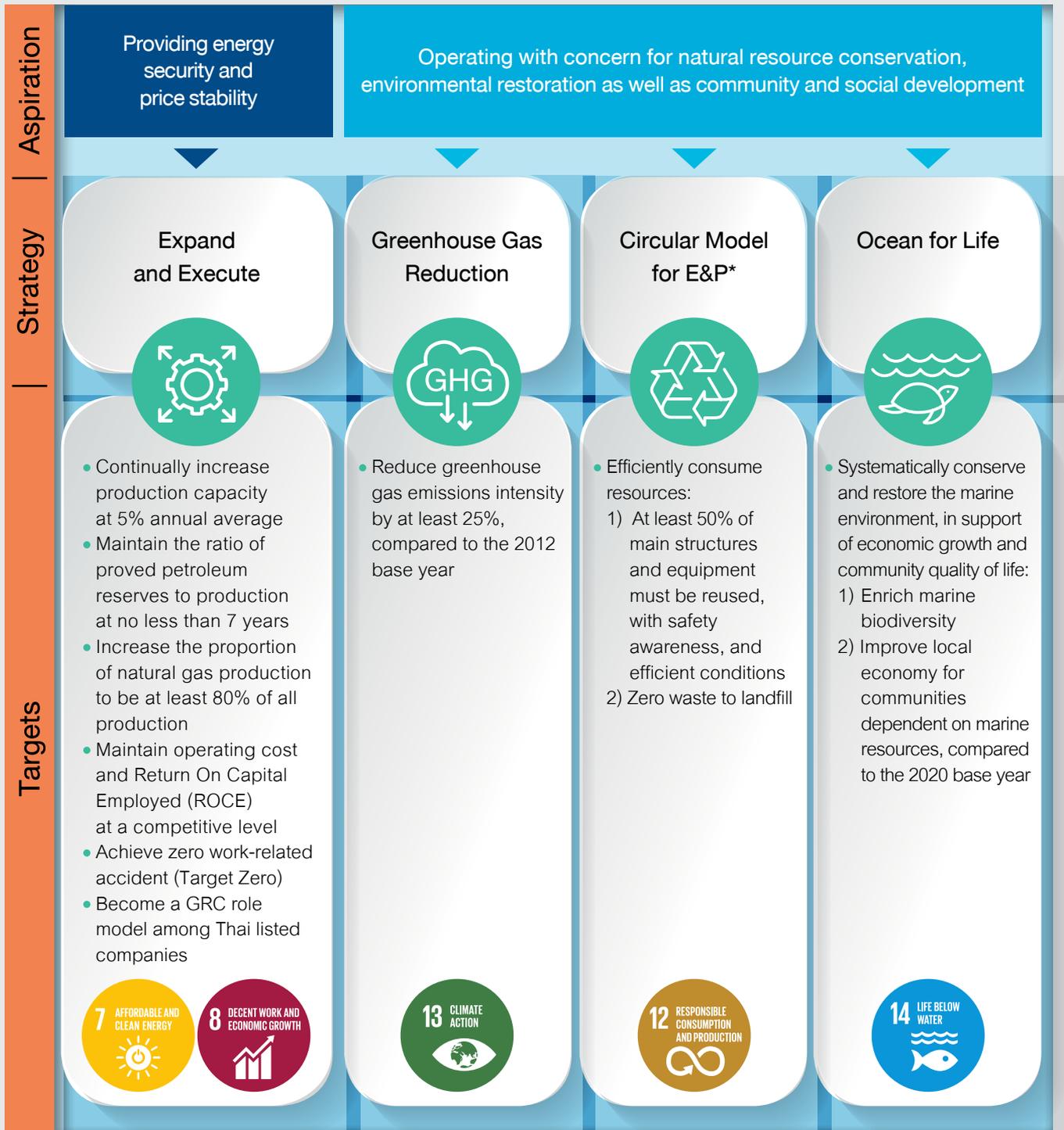
- 3 Lower Carbon Future
- 5 Contribution to Communities and Society
- 6 Environmental Management

Shared Expectations of PTTEP and Stakeholders from the 2019 Assessment

“PTTEP shall maintain competitiveness and good corporate governance in ensuring national energy security amid energy transition within the context of limited natural resources. PTTEP should also take a leading role in the conservation and restoration of the marine environment which is presently in a state of degradation and becoming a global concern.”

Sustainability Strategy and Long-Term Targets (2030)

PTTEP prioritized the material issues and formulated sustainability strategy and corporate long-term targets (2030) in four dimensions, which also supported the United Nations Sustainable Development Goals (UN SDGs)



In addition to the corporate-level sustainability strategy and long-term targets, PTTEP recognizes the importance of social development projects in operating areas. We commit to continuing the implementation of social development projects that appropriately meet the needs of the stakeholders in each location in four main areas: basic needs, education, environment, and culture. Our projects include the Crab Hatchery Learning Center project, the Mobile Health Check program in the Republic of the Union of Myanmar, SIOLA Pre-school Development project in the Republic of Indonesia, Waste to Energy project in Thailand, and etc. In 2019, PTTEP implemented over 140 social development projects, covering all operating areas.

* E&P - Exploration and Production



Expand and Execute Strategy



In strengthening national energy security and price stability to correspond to current domestic and global energy contexts, PTTEP focuses on a proactive strategy to enhance the organization's competency in order to prepare for future challenges including the increasing role of alternative energy sources and disruptions from other technology.

Targets

-  Continually increase production capacity at 5% of annual average
-  Maintain the ratio of proved petroleum reserves to production at no less than 7 years
-  Increase the proportion of natural gas production to be at least 80% of all production
-  Maintain operating cost and Return on Capital Employed (ROCE) at a competitive level
-  Achieve zero work-related accident (Target Zero)
-  Become a GRC role model among Thai listed companies

Proactive strategy focuses on 2 elements:



Business Overview

PTTEP's core business is petroleum exploration and production, with operations and investments in Thailand and overseas. As of December 31, 2019, PTTEP had 47 petroleum exploration and production projects in 15 countries.



Myanmar	Thailand
<ul style="list-style-type: none"> Zawtika Project Participation Interest: 80% Operator: PTTEP Yadana Project Participation Interest: 25.5% Operator: Total Yetagun Project Participation Interest: 19.31784% Operator: Petronas Myanmar M3 Project Participation Interest: 80% Operator: PTTEP Myanmar M11 Project⁴ Participation Interest: 100% Operator: PTTEP Myanmar MD-7 Project Participation Interest: 50% Operator: PTTEP Myanmar MOGE 3 Project Participation Interest: 77.5%⁵ Operator: PTTEP 	<ul style="list-style-type: none"> Bongkot Project Participation Interest: 66.6667% Operator: PTTEP S1 Project Participation Interest: 100% Operator: PTTEP PTTEP 1 Project Participation Interest: 100% Operator: PTTEP B6/27 Project Participation Interest: 100% Operator: PTTEP Arthit Project Participation Interest: 80% Operator: PTTEP L22/43 Project Participation Interest: 100% Operator: PTTEP L53/43 & L54/43 Project Participation Interest: 100% Operator: PTTEP E5 Project Participation Interest: 20% Operator: ExxonMobil

Canada <ul style="list-style-type: none"> Mariana Oil Sands Project Participation Interest: 100% Operator: PTTEP 	Mozambique <ul style="list-style-type: none"> Mozambique Area 1 Project Participation Interest: 8.5% Operator: Total¹ 	Kazakhstan <ul style="list-style-type: none"> Dunga Project² Participation Interest: 20% Operator: Total 	Angola <ul style="list-style-type: none"> Block 17/06 Project² Participation Interest: 2.5% Operator: Total 	Algeria <ul style="list-style-type: none"> Algeria 433a & 416b Project Participation Interest: 35% Operator: GBRB Algeria Hassi Bir Rekaiz Project Participation Interest: 24.5% Operator: PTTEP 	Vietnam <ul style="list-style-type: none"> Vietnam 9-2 Project Participation Interest: 25% Operator: HV JOC Vietnam 16-1 Project Participation Interest: 28.5% Operator: HV JOC Vietnam B & 48/95 Project Participation Interest: 8.5% Operator: Petrovietnam Vietnam 52/97 Project Participation Interest: 7% Operator: Petrovietnam 	Malaysia <ul style="list-style-type: none"> Malaysia Project⁶ Participation Interest: 6.4 - 80%⁷ Operator: PTTEP⁷ 	Indonesia <ul style="list-style-type: none"> Natuna Sea A Project Participation Interest: 11.5% Operator: Premier Oil
Mexico <ul style="list-style-type: none"> Mexico Block 12 (2.4) Project Participation Interest: 20% Operator: PC Carigali Mexico Mexico Block 29 (2.4) Project Participation Interest: 16.67% Operator: Repsol Exploración México 	Brazil <ul style="list-style-type: none"> Potiguar Project² Participation Interest: 50% Operator: PTTEP Barreirinhas AP1 Project Participation Interest: 25% Operator: Shell Brasil Brazil BM-ES-23 Project Participation Interest: 20% Operator: Petrobras 	Oman <ul style="list-style-type: none"> PDO (Block 6) Project² Participation Interest: 2% Operator: Petroleum Development Oman Mukhaizna (Block 53) Project² Participation Interest: 1% Operator: Occidental Petroleum 	United Arab Emirates <ul style="list-style-type: none"> Abu Dhabi Offshore 1 Project³ Participation Interest: 30% Operator: Eni Abu Dhabi B.V. Abu Dhabi Offshore 2 Project³ Participation Interest: 30% Operator: Eni Abu Dhabi B.V. 	Australia <ul style="list-style-type: none"> PTTEP Australasia Project Participation Interest: 90 - 100%⁸ Operator: PTTEP 	Overlapping Area <ul style="list-style-type: none"> MTJDA Project Participation Interest: 50% Operator: CPOC G9/43 Project Participation Interest: 100% Operator: PTTEP 		

- Phase of Exploration
- Phase of Development
- Phase of Production
- Phase of Exploration/ Development/ Production

1 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.
 2 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 were completed in November 2019.
 3 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.

4 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.
 5 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.
 6 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 were completed in July 2019. Subsequently, PTTEP has grouped and named investments of all projects in Malaysia under "Malaysia Project".

7 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 joint venture partner with participation interest of 6.4%, and Shell is the Operator.
 8 PTTEP Australasia Project holds many petroleum blocks which have varying participation interests ranging from 90 - 100%.
 9 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.
 10 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.

Business Expansion in 2019

In 2019, PTTEP expanded our business operations through various projects. The signing of production sharing contracts for Bongkot and Erawan fields, the acquisition of Murphy Oil Corporation's assets in Malaysia, the securing of the petroleum exploration and production rights for 2 blocks off Peninsular Malaysia, the partnership with Eni Company Limited in winning the bid for exploration blocks in the United Arab Emirates, 100% takeover of Partex Holding B.V. which has a business stronghold in the Middle East, and the purchase of APICO LLC's shares in support of Sinphuhorm Project development to serve electricity generation in the Northeast of Thailand.

For exploration, PTTEP discovered a large volume of gas in the Sarawak SK410B project in Malaysia, which offers an opportunity for petroleum production and an increase in our petroleum reserves. Additionally, PTTEP implemented the operation transition plan for Bongkot and Erawan projects as well as other newly acquired projects with an intention to ensure smooth transfer of operations and maintain production volume as planned.



With a proactive strategy in 2019, PTTEP succeeded in achieving both Return On Capital Employed (ROCE) at 11%, which was higher than the industry average and the cost per unit of energy production, which was kept at a competitive level compared to that of other petroleum exploration and production companies in Asia. Meanwhile, the Proved Reserved to Production Ratio (R/P) was at 7.5 years, which was higher than the 7-year target. However, the proportion of natural gas production accounted for 73% of all production which was lower than a long-term company target of 80%.

Ensuring such successes requires competency and readiness of human resources, effective management in all areas as well as the development and application of technology and innovation in enhancing operational efficiency. Good corporate governance, risk management, and strict compliance with laws and regulations are the key foundation to ensure the efficient, transparent, and accountable execution. In 2019, the performance in these aspects are as follows:

Factors to Success



Enhancing Employee Competency

- Continuous improvement of executives' and employees' competency through various development programs, raising average competency by 4.15%, above the 3% target.
- Improved executives' and employees' competency in digital and new ways of working in preparation for business expansion and digital transition through various ENTERPRISE* projects, such as Talent Game, iLearn and Digital Academy.
- Implemented 360 degree evaluation assessment for comprehensive reflection of employees' working behaviors.
- The launch of WeConnect application to facilitate human resource management services.

* ENTERPRISE is a project to transform the organization, work processes, and corporate culture.



.....

“I started my career at PTTEP’s office in Myanmar. I participated in the Individual Development Program (IDP) which is an excellent training program as it allows employee to have experience in other fields of work like engineering and human resources. I had the opportunity to work in the HR division and learned about recruitment, remuneration, and competency management. I am currently working in employee relations division. For two years and seven months, I have learned many things I never dreamt of if I had worked for other companies in my country. I am confident that the knowledge gained from the IDP program will support my career once I return to my country.”

.....

Mr. Brang Lawt Aung

An employee in the Republic of the Union of Myanmar who participated in Individual Development Program (IDP) Human Resources Division



.....

“Having served PTTEP for more than ten years, I am proud to be a part of the organization which plays a vital role in energy exploration, a key to drive the country forward. Throughout the years, PTTEP has continually emphasized human resource development, encouraging employees to join training programs and embracing new ideas so that we can improve our work”

.....

Ms. Daranee Kijkannuntasri

Manager,
Financial Consolidation Section



Occupational Health and Safety

PTTEP promoted a Safety, Security, Occupational Health and Environment (SSHE) culture, as well as continuously improved SSHE management system to ensure the highest level of safety for all employees and contractors. In 2019, safety statistics improved and was in line with the International Association of Oil and Gas Producers (IOGP) average.

- Lost Time Injury Frequency (LTIF): 0.07 cases per million hours worked



- Total Recordable Injury Rate (TRIR): 0.55 cases per million hours worked



- Loss of Primary Containment Rate (LOPCR): 0.09 cases per million hours worked



.....

“I have full confidence in safety when working with PTTEP. I have exercised PTTEP executives’ policy on stop work authority that gives employees and contractors “authority and responsibility” to stop work when facing unsafe acts or work conditions that might lead to accidents. The “4 Stops” campaign promotes: 1. Stop yourself, 2. Stop your friend, 3. Stop using, and 4. Stop doing - when it is unsafe. I am exercising this in my work and everyday life.”

.....

Mr. Kraitsanarat Wimaro
Scaffold Installation Supervisor,
CES Engineering and
Maintenance Services Co., Ltd.



.....

“Creating a safe work environment is one of PTTEP’s most important arrangement for employees and contractors, working for the company. Promoting the use of stop work authority when it appears unsafe is a proactive measure in dealing with the risks before they cause problems or lead to accidents. It helps create a culture of safety at work.”

.....

Mr. Satawat Chaiyasit
API Standard Inspector,
Thai NDT PCL.



Supply Chain Management and Sustainable Development of Suppliers

- Increased proportion of green procurement to 11% of total procurement value
- Supported local suppliers that developed products and services to meet PTTEP’s standards and requirements
- Put in place vendor and supplier management measures and assessment to ensure their compliance with requirements and international standards
- Ensured transparent and fair procurement process by increasing the proportion of suppliers selected through the bidding process to 83% of procurement spending in 2019
- Managed inventory using a centralized database to identify stock items. Used items in good condition and reusable are returned to the central storage to reduce purchase volumes, procurement processes, and time
- Increased vessels’ cargo deck utilization to 88% on average to ensure the efficient consumption of marine gas oil




Financial Management

- Applied Blockchain technology for international payment transfers to reduce errors, costs, and processing time, and importantly raise transparency and security
- Applied virtual account to achieve higher automation in the work process, thus reducing work time and human errors
- Revised accounting, financial and tax policies to align with the organization’s expansion and international standards
- Regularly communicated with investors to ensure better understanding




Governance, Risk Management and Compliance (GRC)

- Revised workplan to align with the result from GRC Maturity Level assessment and communicated to related parties
- Revised GRC processes related to M&A and new business establishment to support PTTEP’s business direction
- Improved GRC reporting and revised the reporting topics to cover important issues, such as IT security





Greenhouse Gas Reduction Strategy

Global warming and climate change have been the key and urgent issues at both national and global levels, with their significant implications on economic, social, and environmental aspects. PTTEP is committed to operating responsibly to mitigate possible impacts under a target to reduce greenhouse gas emissions intensity by at least 25% by 2030, from the 2012 base year.

In 2019, PTTEP maintained our emphasis on improving the production process and initiating new technology development projects to help reduce greenhouse gas emissions. As a testament of success in the past years, the emissions intensity decreased by 14% compared to the 2012 base year with the reduction of greenhouse gas 256,498 tonnes of CO₂ equivalent. The success was attributable to the following projects:



2030 Target



Reduce greenhouse gas emissions intensity by at least 25% compared to the 2012 base year



Flare Gas Recovery and Utilization

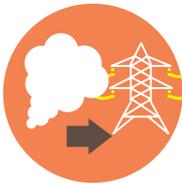
In 2019
Greenhouse Gas Emissions
reduced by
194,124
tonnes of CO₂ equivalent

2019 projects



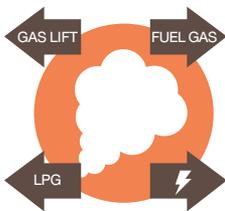
- Recovered excess gas from condensate to production process by installing Flare Gas Recovery Unit (FGRU) at Greater Bongkot South (GBS) project.

Greenhouse Gas Emissions
reduced by
117,095
tonnes of CO₂ equivalent



- Sold flare gas at the Sao Thian-A production station at S1 project to a local power producer who supplies power to communities.

Greenhouse Gas Emissions
reduced by
37,597
tonnes of CO₂ equivalent



- Recovered gas from outstations and sent it to the main pipeline at S1 project's Nong Toom-A production station for the transfer to the flow station. This process reduced gas combustion at outstations and the gas was recycled as gas lift and Liquefied Petroleum Gas (LPG) which was sold to PTT, and other small buyers.

Greenhouse Gas Emissions
reduced by
23,645
tonnes of CO₂ equivalent

- Applied more-efficient membranes and reduced CO₂ emissions: In 2019, PTTEP switched to use new membranes for flare gas separation process at Arthit and Greater Bongkot South fields in the Gulf of Thailand. The membranes increased the efficiency of CO₂ separation from natural gas.

CO₂ Emissions
reduced by
12,578
tonnes of CO₂ equivalent

- Installed additional gas ejector at the flow station of S1 project, an onshore petroleum production field, to recover flare gas.

Greenhouse Gas Emissions
reduced by
3,210
tonnes of CO₂ equivalent

Energy Efficiency

In 2019
Greenhouse Gas Emissions
reduced by
62,374
tonnes of CO₂ equivalent

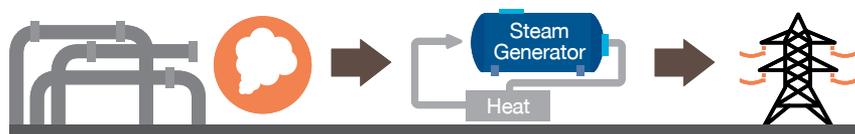
2019 projects

- Reduced the use of cooling system's water pump to improve efficiency.

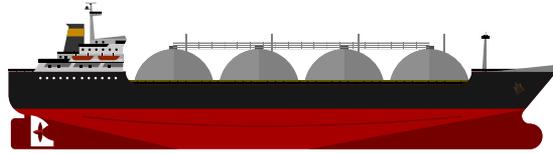
Greenhouse Gas Emissions
reduced by
5,913
tonnes of CO₂ equivalent

- Used a steam generator to generate electric power with exhaust gas from S1 project flow station's gas pipes.

Greenhouse Gas Emissions
reduced by
10,988
tonnes of CO₂ equivalent



- Improved marine transportation efficiency to reduce logistics costs and greenhouse gas emissions through 2 main approaches:



- Maintained efficiency and reduced logistics operating cost by, for example, maximizing vessels' cargo deck space utilization to control marine gas oil consumption.

In 2019, PTTEP's cargo space utilization rate was **88%**
.....
Greenhouse Gas Emissions reduced by **39,104** tonnes of CO₂ equivalent

- Proceeded with Smart Marine Model Project in the Republic of the Union of Myanmar, through the Centralized Vessel Utilization Management system.

Fuel consumption was reduced by **2.07** million liters
.....
Greenhouse Gas Emissions reduced by **6,368** tonnes of CO₂ equivalent

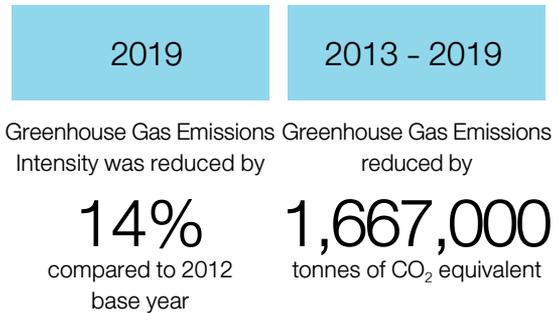
Methane Leakage



Methane is a highly potent greenhouse gas that contributes to global warming more than CO₂. Therefore, the company focuses on Methane gas detection and maintenance of where the leaks are found, which helps reduce greenhouse gas emissions.

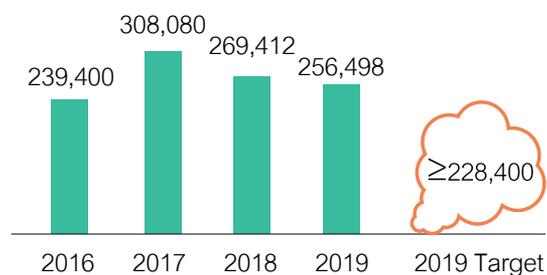
To achieve greenhouse gas reduction goal, PTTEP has emphasized research and development of Carbon Capture Utilization and Storage (CCUS) technology, in parallel with greenhouse gas reduction activities.

While greenhouse gas emissions from operations was continuously reduced, PTTEP extended our focus to benefit the community and the environment. Flare Gas Utilization for Community Agricultural Product and Environment project was launched in cooperation with the Department of Mineral Fuels, Ministry of Energy and Nong Toom-A Community in Kong Krailat District, Sukhothai Province where S1 project is located. Under this project, excess associated gas from the crude oil production process at Nong Toom-A Production Station, 1 km away from the community, was sold to Nong Toom Banana Processing Cooperative at a price lower than LPG market price. It also reduced greenhouse gas emissions by more than 5,000 tonnes of CO₂ equivalent per year. In addition, in 2019, PTTEP conducted Phase 1 carbon storages study on a reforestation project started in 2013. It covered 52,500 rais of the forest and indicated that the forest stored 1.4 tonnes of CO₂ per rai, or a total of 73,500 tonnes per year.



Reduction Volume of Greenhouse Gas Emissions from Production Processes

(tonnes of CO₂ equivalent)





Circular Model for E&P* Strategy

PTTEP realizes the importance of natural resources and accordingly emphasizes strategy that maximizes natural resources and reduces waste. Work processes were redesigned and resources were reused and recycled. The target is to reuse at least 50% of main structures and equipment which are retained at appropriate, safe, and efficient conditions by 2030. PTTEP also aims for zero waste to landfill, so as to minimize environmental impacts from waste handling before it goes to landfill.

PTTEP also promotes efficient and eco-friendly use of resources and energy at head office in Bangkok and upcountry offices. In 2017, PTTEP head office was first presented the Green Office Award: Excellent Level (G-Gold) from the Department of Environmental Quality Promotion. Since then, PTTEP has received this award for our other offices: Petroleum Development Support Base in Songkhla Province in 2018 and Petroleum Development Support Base in Ranong Province in 2019. One of the activities under this project concerned the reduced use of resources. The provision of single-use plastic bottled water at all conference rooms is banned, helping instill awareness in environmental conservation among employees.

 **2030 Targets**



At least 50% of main structures and equipment must be reused with appropriate, safe and efficient conditions

Zero waste to landfill, with the following sub-targets:

	2020 Hazardous Waste to Landfill = 0
	2025 Industrial Waste to Landfill = 0
	2030 Total Waste to Landfill = 0



* E&P - Exploration and Production

Highlight Projects

Study on Drill Cuttings as Alternative Material for Roadworks

PTTEP systematically manages production waste in accordance with international standards and circular economy concept. We have conducted research on methods and technologies that will generate value and maximize the efficiency of the waste disposal process. One interesting project is a study on the use of rocks and soils generated from our drilling activities (drill cuttings) as an alternative material for road construction and maintenance. This material was previously regarded as waste and disposed by way of high-temperature incineration in cement plants. PTTEP collaborated with the Department of Rural Roads, Ministry of Transport and Ministry of Energy's Department of Mineral Fuels to conduct a feasibility study on using drill cuttings as an alternative material. The project not only benefited the construction and maintenance in PTTEP's surrounding communities, but also supported the maximization of resource utilization under the circular economy concept and PTTEP's sustainability strategy.

This study began in 2018 and continues to the present. The initial results showed that drill cuttings, considered waste in the production process, was suitable and safe as material for road construction. PTTEP and concerned agencies plan a pilot test at the S1 project and PTTEP Technology and Innovation Centre (PTIC) at Wang Chan Valley, Rayong Province, which is situated in the area of Eastern Economic Corridor of Innovation (EECi). The pilot test is scheduled for the third quarter of 2020.



Rotation of Mobile Facilities for Onshore Petroleum Production Stations at S1 Project

To achieve optimum efficiency, production facilities at the S1 project were designed and operated to be mobile, to replace permanent production stations. There are two types of S1 project mobile facilities:

1) Mobile Production Facility (MPF):

For petroleum production at sites where there is no production station or pipeline. Currently there are 16 MPFs at S1 project.

16
MPFs



2) Mobile Production Test Unit (MPTU):

For petroleum well testing, to assess potential and assist future production planning. Currently, there are 10 MPTUs at S1 project.

10
MPTUs



S1 project implemented various initiatives to extend the life time of production equipment. For example, abandoned production site equipment was modified and used at new sites. Old equipment was repaired and retained as emergency spare parts. Technology was introduced to prolong the life of various equipment such as the use of non-metallic pipes and the study of corrosion inhibitors.

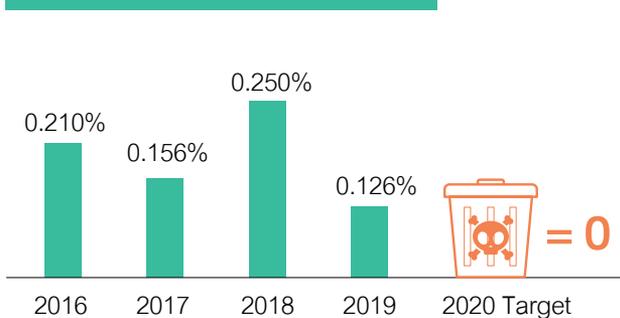


For offshore projects, PTTEP plans to reuse topside platforms from depleted wells to reduce the imports of materials and equipment to maximize resource value. The topside reuse will start with Arthit Project in 2021.



Aside from adjusting work processes in accordance with the circular economy concept, PTTEP extends this effort to neighboring communities. For example, used materials and equipment in good and safe condition from S1 project, such as metal pipes and barrels, were donated to various communities and government offices for public use. PTTEP also takes pride in promoting alternative energy to the community through the production of cooking gas from household waste. At the end of 2019, PTTEP had installed 241 biogas digesters for communities near Sinphuhorm project in Udon Thani Province. Additionally, the company built the Ban Thap Hai Biogas Learning Center to pass on knowledge to interested parties. PTTEP has also expanded the project to cover communities near Zawtika project in the Republic of the Union of Myanmar.

A hazardous waste to landfill (%)



On waste management, PTTEP has applied the 3R principles (Reduce, Reuse, Recycle) to achieve maximum efficiency in resource utilization. This has resulted in a continuous reduction of waste to landfill. In 2019, offshore petroleum production fields in the Gulf of Thailand had no hazardous waste to landfill. In 2020, PTTEP aims to achieve zero hazardous waste to landfill target at all operating units.



Ocean for Life Strategy



Oceans are sources of natural resources that nurture human lives. However, marine ecosystems are facing multiple challenges, including water quality, waste, and diminishing biodiversity which directly affect the quality of life of coastal communities and indirectly affect many more lives on earth.

PTTEP, whose operations are mostly offshore, realizes that we are bound to best protect the seas where we operate. The “Ocean for Life” strategy was formulated to reaffirm PTTEP’s determination to be a leader in conserving and restoring natural resources and marine ecosystems through a combination of biodiversity management approaches. These include the monitoring and restoration of degraded habitat, increasing marine species, with an economic value to serve as food sources, and promoting sustainable resource utilization. All lead to a better quality of life for communities that depend on marine resources.



2030 Targets

Systematically conserve and restore the marine environment, to support economic growth and community quality of life



Enriching marine biodiversity, compared to the 2020 base year



Improve local economy for communities, dependent on marine resources, compared to the 2020 base year

Highlight Projects

Decommissioning for New Lives under the Sea



Decommissioning of installations and facilities is part of the life cycle of the exploration and production value chain which occurs at the end of the concession. It is a challenging mission both in terms of management and operating in accordance with the safety standard as well as social and environmental best practices. To handle this challenge, PTTEP set up a decommissioning team in 2015 to outline the decommissioning process, to assess the technology and feasibility of various approaches to be considered for decommissioning work, to achieve optimum efficiency, and to minimize any possible social and environmental impacts.

PTTEP has conducted research and feasibility studies on several projects in preparation for future decommissioning. One of them was the laying of artificial coral reefs, composed from metal structures at Koh Pha Ngan in 2013. The project was the result of good cooperation between the Department of Marine and Coastal Resources, the Petroleum Institute of Thailand Foundation, petroleum business operators and local community leaders and residents. Four artificial reef structures were placed in the Gulf of Chalok Lam, Koh Pha Ngan Sub-district, Koh Pha Ngan District, Surat Thani Province. A year later, several sessile such as bivalves, sea urchins, *Balanus* sp., and bryozoa were spotted, with striped sea urchins being the most frequently seen.

Another feasibility study was carried out in 2017 on transforming petroleum production jackets into artificial reefs the Rig to Reef project, in collaboration



with the Petroleum Institute of Thailand Foundation, petroleum operators, academic institutions, and concerned government agencies, namely the Department of Mineral Fuels, Department of Fisheries, Department of Marine and Coastal Resources, Marine Department and the Royal Thai Navy. Rig to Reef project is one of the decommissioning options, which requires environmental impact assessment and approval from the Department of Mineral Fuels and other related the agencies, to ensure best approach and true benefits for society and related communities. The Rig to Reef project is an approach not only to maximize the value of decommissioned structures, but also to help conserve and restore marine natural resources. It now serves as a habitat and sanctuary for marine lives, enhances bio-diversity, as well as offers benefits to the academic, tourism, and fishery communities.

From Royal Ships to Underwater Learning Sites, the Final Mission for the Thai Sea

Responding to the phenomenon of “Coral Bleaching” that created a knock-on effect on marine lives, in 2011, PTTEP, in collaboration with the Department of National Parks, Wildlife and Plant Conservation; Department of Marine and Coastal Resources, local agencies, local communities and the Royal Thai Navy, initiated the “H.T.M.S. Underwater Learning Sites” project. H.T.M.S. Prab was laid on the seabed near Koh Ngam Noi, Chumphon Province, and H.T.M.S. Sattakut was laid on the seabed near Koh Tao, Surat Thani Province. Both serve as alternative diving spots in those areas allowing natural coral reefs to recover from bleaching and also becoming research sites on marine biodiversity.

The two sites have become popular diving spots, generating income of over THB 59 million for local communities and business operators or a total of approximately THB 472 million since beginning. In 2018, PTTEP released a book and a short TV documentary to raise awareness among tourists and divers as well as the general public on the importance and benefits of these two man-made diving sites.





Sea Turtle Conservation Project, to Raise Survival Rates

The number of sea turtles in Thailand has declined and their extinction may come soon because of several natural and man-made factors. Without conservation, sea turtles might completely disappear from the Thai seas. In 2017, PTTEP thus supported the Royal Thai Navy's Sea Turtle Conservation Center in Sattahip District, Chonburi Province. A Memorandum of Understanding (MoU) was signed between PTTEP and the Royal Thai Navy to enhance sea turtle conservation and promote conservation knowledge.

Under the MoU, PTTEP supported the renovation and modernization of the nursery and hospital building, the only one of its kind in Asia to align with international standards on sea turtle nursing and treatment prior to release to the sea, to raise their survival rate. PTTEP provided the center with medical equipment, organized an exhibition, and prepared learning kits on sea turtle conservation. It also sponsored the center's landscape improvements. The center is now an eco-tourism destination.

Moreover, PTTEP has encouraged its employees and executives to volunteer in sea turtle conservation activities, such as, the cleaning of turtle ponds, turtle shell scrubbing, and the release of baby sea turtles to the sea.

2019



21,482

Accumulated number of baby sea turtles were nursed and treated

"Thanks to the medical equipment provided by PTTEP, the hospital enjoys a greater capacity in treating sea turtles. As diagnosis can be done faster, treatment becomes faster and so does the survival rate of sea turtles"



2,234

Accumulated number of turtles were treated due to beaching and injuries caused by trawls and other natural causes

Sub Lieutenant Kornkamol Kitikamara
Veterinarian at the Sea Turtle Conservation Center, Royal Thai Navy

The Plan for 2020



The support to the Sea Turtle Conservation Center in Songkhla Province, through the collaboration with the Second Naval Area Command, a unit will be set up at the Songkhla Naval Base to support the conservation of the Thai seas and this endangered species.



Total visitors to the Sea Turtle Conservation Center

922,793

Crab Hatchery Learning Center: Passing on Knowledge and Sustainably Raising Fishermen's Income

The declining number of marine animals' lives with an economic value such as "Crab" affected fishermen's income and a number of households had to turn to other livelihoods. PTTEP recognized the severity of the problem and the importance of restoring the abundance and biodiversity of the marine ecosystems. In 2013, PTTEP in partnership with the Ban Hua Khao Community, Institute of Coastal Aquaculture, and Rajamangala University of Technology Srivijaya, Songkhla Province, to establish "Ban Hua Khao Crab Hatchery Learning Center" at Ban Hua Khao Sub-district, Singhanakhon District, Songkhla Province, to cultivate knowledge on crab hatchery.

Three more learning centers were established in Ban Phang Sai, Sathing Phra District, Songkhla Province and Ban Panare, Panare District, Pattani Province, and Na Saton Sub-district, Hua Sai District, Nakhon Si Thammarat Province, with the construction work completed in December 2019. The three centers at Songkhla and Pattani Province have welcomed more than 10,000 visitors. The accumulated number of juvenile crabs returned to nature has exceeded 1 billion. To restore marine resources and support communities in a sustainable manner, PTTEP has collaborated with marine and coastal resources conservation networks. Currently, there are 33 networks in Songkhla, Pattani and Nakhon Si Thammarat Province, covering 25 conservation areas that stretch over 18 square kilometers.



Social Return on
Investment (SROI)

1 : 2.29

Baseline Study of Microplastics in the Gulf of Thailand's Offshore

Thailand has recognised the need for the management of ocean waste, as seen in the collaboration on this issue with many organizations including the Department of Marine Science, Kasetsart University. They have conducted a study on microplastics in nearshore areas like those in Rayong Province and Pattaya City. However, the study did not cover offshore waters due to high costs and the difficulty in collecting seawater samples.

PTTEP, with offshore projects such as Arthit, Greater Bongkot North and Greater Bongkot South, has supported the Department of Marine Science, Kasetsart University since 2019, in studying microplastics in offshore waters of the Gulf of Thailand. This is the first national baseline study. The results are believed to help both the government and private sectors in formulating measures against ocean waste, and will create large-scale social benefits, in line with PTTEP's sustainability management principle.



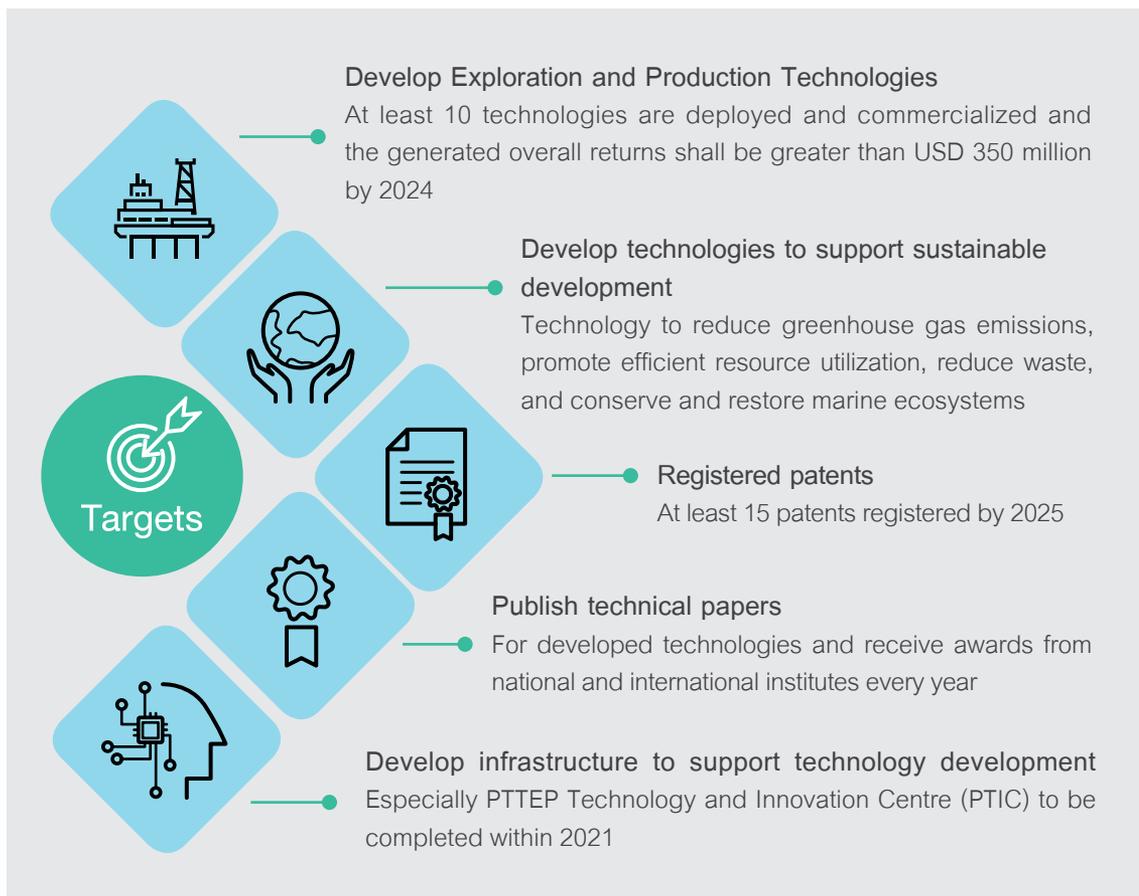
Towards a Sustainable Organization for a Sustainable World

To achieve our goal of becoming a sustainable organization amid business challenges and trends of energy transition, PTTEP is fully aware that, apart from the sustainability strategy, emphasis must be placed on the development of technology and innovation as well as collaboration and networking with other organizations and government agencies.

Technology and Innovation Development

Technology and innovation development is crucial in enhancing work efficiency, and preparing the company for changes and risks, that may arise from technological advances and demand for alternative energy. Therefore, the company has allocated three percent of annual net income to support the technology and innovation development.

PTTEP sets the following five targets to consistently drive technology and innovation development:



Achievements in 2019

PTTEP's technology and innovation development roadmap proceeded as planned in 2019, with several projects showing faster-than-expected progress. The achievements are summarized below:

 <p>Development progress</p> <ul style="list-style-type: none"> • 8 projects at the prototype development phase • 2 projects at the pilot phase • 2 projects being deployed  <ul style="list-style-type: none"> • 11 intellectual property applications were submitted: 9 patents, 2 software copyrights, 1 patent from previous submission was also granted in 2019 • 12 research papers were published in international journals and academic conferences • 1 award received 	 <p>Improvement of technology development management as well as the online management system, and intellectual property management procedures for efficient execution</p>  <p>Application of digital technology, such as cloud data storage, in E&P* process and business operations, to save cost, time, and resources while increasing efficiency and agility</p>	 <p>Technology development plan in short and long terms for 5 core functions</p> <ul style="list-style-type: none"> • Advanced Exploration • Enhanced Oil Recovery • Unlock High CO₂ Reserves • Condensate Contaminant Treatment • Decommissioning
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Collaboration and Networking

Collaboration and networking are highly essential for operations today and sustainable growth in the future. Apart from collaboration networks in the business dimension, PTTEP also focuses on fostering collaboration and networks in community development, social and environmental dimensions. Such collaboration is geared towards the creation of innovation and knowledge for efficient implementation, in support of the sustainability-oriented National Economic and Social Development Plan, including the United Nations Sustainable Development Goals (UN SDGs).

Examples of PTTEP's activities in the development of collaboration networks include: the establishment of PTTEP Technology and Innovation Centre (PTIC) at Wang Chan Valley, Rayong Province, where the Eastern Economic Corridor of Innovation (EECi) is located; contributions to the national development of science, technology, and innovation through support to Kamnoetvidya Science Academy School (KVIS), and Vidyasirimedhi Institute of Science and Technology (VISTEC). Moreover, PTTEP also recognizes the importance of fostering knowledge and research networks with other leading companies and organizations, to create new knowledge and apply it in addressing national issues effectively and concretely. In 2019, PTTEP conducted 81 research and development projects, in cooperation with over 15 public and private organizations.

Moreover, PTTEP is a member of sustainability-oriented networks at both international and national level including United Nations Global Compact (UNGC) membership at Advanced level, Thailand Business Council for Sustainable Development (TBCSD), Thailand Responsible Business Network (TRBN), and Global Compact Network Thailand (GCNT).

Stakeholder Value Creation

To achieve our vision to become an “Energy Partner of Choice”, in 2019, PTTEP created and passed on value to six major stakeholder groups through the allocation of resources in six areas and the work processes that support the Company’s vision and strategy. The results are as follows:

Input

	<ul style="list-style-type: none"> Debt to equity policy <0.5 Shareholders’ equity* USD 11,841 million Interest bearing debt* USD 3,442 million Credit ratings BBB+ (S&P), Baa1 (Moody’s), BBB+ (Fitch), AAA (TRIS)
	<ul style="list-style-type: none"> Natural resources Energy consumption: 26 million gigajoules Water consumption: 47 million cubic meters Environmental management expenses: over USD 8 million
	<ul style="list-style-type: none"> 47 projects in 15 countries Total procurement value: USD 965 million Over 70 initiatives to increase efficiency, and reduce production cost
	<ul style="list-style-type: none"> 4,449 employees with more than 10 nationalities 2,573 Suppliers Employee development and training: 43 hours/person/year Skills and experiences of suppliers, contractors, and business partners
	<ul style="list-style-type: none"> Expenses of corporate social responsibility projects: USD 11.16 million 11,196 employee volunteer hours Activities to build networks of environmental conservation and social development, with a focus on engagement of stakeholders at all levels
	<ul style="list-style-type: none"> Technology and innovation development budget: USD 24 million Executives and working team tasked to oversee corporate technology and innovation development Researchers and employees who operate the development projects Collaboration with 15 external organizations to develop technology and innovation

Energy Partner of Choice
through competitive performance and innovation for long-term value creation

Vision and Strategy

- Expand and Execute
- Greenhouse Gas Reduction
- Circular Model for E&P**
- Ocean for Life
- Governance, Risk Management and Compliance

Output / Impact

Stakeholder

Efficient fund-raising process to support strategic growth at a reasonable financial cost as well as competitive and sustainable returns

- Operating revenue: USD 6,413 million
- Earnings before interest, tax, depreciation and amortization (EBITDA): USD 4,354 million
- Net profit: USD 1,569 million
- Dividend payout: 49% or Dividend yield: 4.82%
- Unit cost: USD 31.7 per BOE
- Return on Capital Employed (ROCE): 11% (higher than the average of E&P** industry in Asia)
- Royalty fee and taxes: USD 1,636 million

PTTEP delivered competitive and sustainable returns to shareholders and the government through a strong financial structure. This was achieved through efficient fund raising, aligned with risks and opportunities due to volatility in the energy industry. The returns reflected the company’s ability to maintain adequate liquidity for operations and investment opportunities. With appropriate financial costs, PTTEP achieved worthwhile, consistent, and competitive profitability and dividends.



Reduced greenhouse gas emissions intensity to mitigate global warming impacts and maximize the efficiency of natural resource utilization with deep concern for the environment

- Reduced greenhouse gas emissions: 256,498 tonnes of CO₂ equivalent
- Saved and recycled energy: 3 million gigajoules
- Reused and recycled waste: 77%
- Reused and recycled water: 12%
- No. of research projects on green technology: 12

PTTEP reduced and prevented possible environmental impacts from PTTEP’s operations as well as building trust and confidence among neighbouring communities, through the implementation of Safety, Security, Health and Environment (SSHE) Management System aligned with ISO14001:2015 at all operating areas.



Focused on business development and expansion by increasing natural gas production capacity, exploration and development activities, and applying efficiency and cost-saving technology, to maintain competitiveness and sustainable growth

- Total production of natural gas: 0.69 trillion cubic feet (111 million BOE)
- Total production of crude oil, LPG and Condensate: 41 million barrels
- Proved Reserve: 1,140 million barrels of oil equivalent
- The proportion of natural gas production accounted for 73% of total production

PTTEP maintained and increased production capacity in response to demand and to manage the production costs at a competitive level. In addition, PTTEP sought to increase petroleum reserves to expand business growth and support corporate growth strategy.



Enhanced organizational capability and safety culture to pursue corporate excellence and prepare employees for future growth

- Lost time injury frequency rate: 0.07 cases per million hours worked
- 100% of all employees completed their individual competency development plans
- Employee competency level increased by 4.15% per year on average

PTTEP was committed to creating safety culture, enhancing employee competency and achieving high-performance organization status. PTTEP emphasized employee competency development to prepare them for changes and business growth. Employees were prepared to become next generation leaders to ensure business continuity. Suppliers’ capability was also enhanced for greater work efficiency, transparency, and mutual growth.



Systematically restored marine natural resources for local economic growth and jointly develop and create value for communities and society, leading to mutual and sustainable growth

- 143 social development projects, focusing on 4 main themes (basic needs, education, environment, and culture)
- Enrich marine natural resources and increase biodiversity through over 60 species, through H.T.M.S. Underwater Learning Site project which generates over THB 59 million in annual income for local communities and business operators
- Fishermen’s income increased THB 60,000* per household per year due to Crab Hatchery Learning Center project
- Community gained higher income and better quality of life
- Stakeholders express trust and cooperation

PTTEP ensured fertile marine resources and community economic growth. PTTEP also sought to build relationship with communities and society by listening to their opinions, expectations, and their cooperation in CSR projects which would improve the livelihood of communities and society.



Delivered competitive technology for E&P** and steer social and environmental projects with technology and innovation

- 81 projects in the development processes
- 5 accumulated projects have been deployed
- Accumulated intellectual properties as the following categories: 4 granted patents, 4 registered software copyrights and 20 pending patent applications
- Accumulated returns at USD 65 million as a result of in-house E&P** technology
- Generating revenue from new businesses based on in-house technology development, including AI and Robotics Venture Company Limited, revenue from commercialized technology reached USD 5.3 million in 2019

With the application of technology and innovation, PTTEP enhanced business competency and opportunities, as well as capability in tackling the challenges today and tomorrow in the economic, social, and, environmental dimensions.



* Average balance between YE 2018 and YE 2019

** E&P - Exploration and Production

* Information as of 2018

Our Affirmation on Sustainable Values

PTTEP, with the aforementioned implementation of strategy under the Sustainable Development framework, believes that while delivering energy security we continue to create long-term value for all stakeholder groups. We delivered on economic, social, and environmental value to society, in line with the United Nations Sustainable Development Goals (UN SDGs)

“PTTEP affirms our intention to continually foster sustainable growth in economic, social, and environmental dimensions. We stand ready to cooperate with partners from all sectors in order to create long-term value for all stakeholder groups, for the benefits of the country and society at large as stated in the company’s vision to become the Energy Partner of Choice”



Awards and Recognition



Sustainability Performance



Member of the 2018 Dow Jones Sustainability Indices (DJSI) in the World Oil and Gas Upstream & Integrated Industry for the sixth consecutive year and the second time as Industry Leader

SAM

Gold Class, the SAM Sustainability Award in The Sustainability Yearbook 2020

SAM

Member of the FTSE4Good Index Series for the fourth consecutive year

FTSE Russell



FTSE4Good

Best Sustainability Awards 2019

The Stock Exchange of Thailand (SET)

Thailand Sustainability Investment Awards 2019 for the fourth time

The Stock Exchange of Thailand (SET)



Corporate Governance

The NACC Integrity Awards
The National Anti-Corruption Commission (NACC)

Rated "Excellent" and received 5 of the National Corporate Governance Committee's symbols, Corporate Governance Report of Thai Listed Companies

Thai Institute of Directors Association (IOD)

Board of the Year Award 2018 - Silver (market capitalization over THB 100 billion)

Thai Institute of Directors Association (IOD)

The Human Rights Awards (the state enterprise sector)

Department of Rights and Liberties Protection, Ministry of Justice

Asia's Icon on Corporate Governance Award for the seventh consecutive year

Corporate Governance Asia Magazine

Asia's Best CEO Award for the second consecutive year

Corporate Governance Asia Magazine



Corporate Social Responsibility



Best Practice Awards 2019 -
● The Forest Restoration for Eco-Learning at Sri Nakhon Khuean Khan Park Project
[Foundation for Thai Society](#)

AREA Awards 2019,
● Winner in Social Empowerment - The Crab Hatchery Learning Center Project
[Enterprise Asia](#)

Global CSR Awards 2019,
● Gold Level in Best Community Program - SIOLA Project
[The 11th Annual Global CSR Summit and Awards 2019](#)



Gulf Sustainability and CSR Awards 2019, Winner in Best Community Development - The Crab Hatchery Learning Center Project
[Gulf Sustainability and CSR Awards 2019](#)

Global CSR Awards 2019,
● Platinum Level in Best Country CSR Excellence - Best in Thailand
[The 11th Annual Global CSR Summit and Awards 2019](#)

BAZNAS Award 2019,
● Best CSR Campaign - The H.T.M.S. Learning Site Project
[BAZNAS Award 2019](#)

Global Good Governance (3G) Awards 2019,
● Winner in Best CSR Campaign - The H.T.M.S. Learning Site Project
[Cambridge IFA](#)

Gulf Sustainability and CSR Awards 2019,
● Winner in Overall CSR - The Crab Hatchery Learning Center Project
[Gulf Sustainability and CSR Awards 2019](#)

Global CSR Awards 2019,
● Gold Level in Best Environmental Excellence - PTTEP Teenergy Project
[The 11th Annual Global CSR Summit and Awards 2019](#)

Asia - Pacific Stevie Awards 2019, Silver Level in Innovation in Community Relations - The H.T.M.S. Learning Site Project
[Stevie Awards Organization](#)

Energy and Environment Foundation Global CSR Awards 2019,
● Platinum Level in CSR - The Waste to Energy Project
[Energy and Environment Foundation](#)



Environmental Management



- || Thailand Energy Awards 2019
 - Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy

- || LESS (Low Emissions Support Scheme) Award
 - Letter of Recognition for the third consecutive year
 - The Thailand Greenhouse Gas Management Organization (TGO)

- || Green Meeting Certificates for PSB Songkhla (Plus Level) and RSB Ranong (Standard Level)
 - Thailand Business Council for Sustainable Development (TBCSD)



- || 2019 Green Office Award at the Excellence (G-Gold) Level
 - Department of Environmental Quality Promotion, Ministry of Natural Resources and Environment



- || 2019 Green Procurement Certificate for the third consecutive year
 - Thailand Environmental Institute (TEI)



Investor Relations

- || Outstanding Investor Relations Awards

The Stock Exchange of Thailand (SET)

- || Asia's Best CFO Award for the sixth consecutive year

Corporate Governance Asia Magazine

- || Best Investor Relations Company (Thailand) Award for the seventh consecutive year

Corporate Governance Asia Magazine



Human Resources Management



- || Thailand's Best Employer Brand Award

Employee Branding Institute and World HRD Congress

- || Best Use of Technology for Recruitment Award

Employee Branding Institute and World HRD Congress

SUSTAINABLE DEVELOPMENT 2019



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1. About This Report

PTT Exploration and Production Public Company Limited (PTTEP) prepares this 2019 Sustainability Report to communicate our economic, social and environmental material issues, commitments and annual sustainability performance to the stakeholders that are both directly and indirectly related to PTTEP business operations. The report covers the period from January 1 to December 31, 2019.

1.1 Our Reporting Approach (GRI 102-50, GRI 102-51, GRI 102-52, GRI 102-54, GRI 102-56)

The contents of this report are determined by PTTEP's performance and material issues which have significant impact on the economic, social and environmental aspects. The report was prepared according to the Global Reporting Initiative (GRI) Sustainability Reporting Standard for the "In Accordance - Core" Option, Oil and Gas Sector Disclosures – OGSD, as well as international frameworks for sustainability management such as Oil and Gas Industry Guidance on Voluntary Sustainability of the International Petroleum Industry Environmental Conservation Association (IPIECA); Dow Jones Sustainability Indices (DJSI); AA1000 AccountAbility Principles Standard 2008 (AA1000APS) of AccountAbility; and SASB Materiality Map™ of the Sustainability Accounting Standards Board (SASB). PTTEP also aims to strengthen the quality of this report for more comprehensive disclosure. Therefore, the Integrated Reporting (IR) guidelines are adopted to describe the relationship between our sustainability performance and corporate financial performance. The guidelines will also be applied as the framework for our future performance disclosures.

The accuracy and completeness of the reporting data on safety, occupational health and the environment as well as detailed performance, are in accordance with the AA1000APS accountability principles standard on inclusivity, materiality and responsiveness, which has been certified by KPMG Phoomchai Business Advisory Co., Ltd. at the level of limited assurance – the details of which are in the Assurance Statement. The financial statements were audited by the State Audit Office of Thailand, and the Audit Report can be found in the 2019 Annual Report.

1.2 Scope and Reporting Boundaries (GRI 102-45, GRI 102-49)

This report covers data collected from PTTEP's operated projects in Thailand and overseas, according to the reporting scope as indicated in the performance scope table under the topic "Performance summary of 2019 material issues". The reporting materiality issues of the 2019 report differs in some key aspects from the previous Sustainability Report as detailed in the Materiality Assessment topic. Economic and financial data are taken from the 2019 Annual Report covering all Exploration and Production (E&P) projects operated by PTTEP or where it is a joint venture partner. In addition, since PTTEP is a subsidiary of PTT Public Company Limited, the content of PTT Sustainability Report therefore covers information on PTTEP.



1.3 Stakeholder Engagement and Expectation (GRI 102-40, GRI 102-42, GRI 102-43)

PTTEP organizes engagement activities with 6 key stakeholder groups: 1) Government agencies and public organizations 2) Vendors and contractors 3) Employees 4) Shareholders, financial institutions and analysts 5) Communities and society and 6) Independent organizations, industrial associations, and press and media. The objective of stakeholder engagement is to solicit feedback and expectations and communicate them to exchange viewpoints. PTTEP uses issues raised by the stakeholders as input to improve the efficiency of our business operations.

Stakeholders	Engagement Approach	Stakeholders' Expectations	2019 Performance Summary
1. Government agencies and public organizations	<ul style="list-style-type: none"> • Case-by-case meetings • Monthly meetings with government agencies and local authorities • Reporting to government agencies • Participation in government networks • Tripartite Committee Meeting • Emergency plan exercise • Whistleblowing through CG hotline 	<ul style="list-style-type: none"> • Systematic joint planning on compliance with government policy and company work program • Joint assessment of situations and their impact, to prevent and resolve them before their impact becoming widespread 	<ul style="list-style-type: none"> • Strictly complied with the relevant laws on business operations • Consulted and communicated with government agencies and local authorities to improve understanding • Participated in 264 activities organized by government agencies and public organizations.
2. Vendors and suppliers	<ul style="list-style-type: none"> • Conferences, trainings, and seminars with vendors and suppliers • Whistleblowing through CG hotline 	<ul style="list-style-type: none"> • Communication of company policies, working standards and procedures, including communication channels • Fair treatment and suppliers development program for sustainable development 	<ul style="list-style-type: none"> • Announced master procurement plan on company's website www.pttep.com • Visited vendors and suppliers sites and conducted joint meetings, to communicate PTTEP policies and hold Q&A sessions • Organized SSHE Contractor Forum with contractors from over 60 companies
3. Employees	<ul style="list-style-type: none"> • "CEO meets Employees" sessions • Regular electronic and other online communication • Whistleblowing through CG hotline 	<ul style="list-style-type: none"> • Communication of company policies and directions, including topics relevant to employees • Improvement of understanding of EP SPIRIT core values 	<ul style="list-style-type: none"> • Held 5 "CEO meets Employees" sessions • Continued to work on embedding EP SPIRIT in employees

Stakeholders	Engagement Approach	Stakeholders' Expectations	2019 Performance Summary
4. Shareholders, institutional investors, and analysts	<ul style="list-style-type: none"> • Annual General Shareholders' Meeting • Analyst meetings • Shareholder and investor roadshows • Quarterly journals • Visits by shareholders to company operations sites • Whistleblowing through CG hotline 	<ul style="list-style-type: none"> • Accurate, complete, thorough and timely information 	<ul style="list-style-type: none"> • Held 19 shareholder and investor roadshows/conferences • Held 4 analyst quarterly meetings on financial statement • Participated in 4 Opportunity Day sessions (organized by SET) • Organized 8 site visits for analysts and shareholders • Held 7 knowledge sharing sessions for investors • Held 40 investor information meetings and conference calls • Produced 4 quarterly journals
5. Communities and society	<ul style="list-style-type: none"> • Monthly meetings with local associations and organizations • Community field visits • Public hearings • Philanthropic activities • Stakeholder commitment survey • Emergency plan exercise • Whistleblowing through organizational representatives and CG hotline 	<ul style="list-style-type: none"> • Effective communication channels to receive company information • Correct understanding on the objectives of company activities, to formulate shared community development plan 	<ul style="list-style-type: none"> • Continued using existing channels engagement and developed community projects to address the needs of the stakeholders in accordance with PTTEP social development strategy • Participated in 294 community activities
6. Independent organizations, industrial associations and press & media	<ul style="list-style-type: none"> • PTTEP membership of various organizations • Press releases and press conferences • Press trip to showcase company activities • Online social media • Websites • Whistleblowing through CG hotline 	<ul style="list-style-type: none"> • Collaboration to drive forward sustainable development • Accurate, timely and concise information 	<ul style="list-style-type: none"> • Be part of various sustainability organizations • Communicated PTTEP new vision and strategies • Produced 59 press releases and held 9 press conferences • Organized 1 press visit to showcase company activities • Had 163 social media (Facebook, Instagram, YouTube, LinkedIn and Twitter) communications • Had 77,172 visitors on PTTEP's website "News and Announcement"

1.4 Stakeholders' Opinions ^(GRI 102-44)

In 2019, PTTEP conducted a stakeholder engagement survey to solicit and gather inputs from all stakeholders (in accordance with the stakeholder inclusiveness principles) on issues about PTTEP's sustainable development through interview and survey questionnaires. PTTEP uses the survey results as input for prioritizing material issues and improving the company's management. In 2019, the key findings are:

(1) PTTEP should provide more information on corporate governance, transparency and compliance, in accordance with the principles of good governance.

(Report Topic: Governance, Risk Management and Compliance)

(2) PTTEP should invest in businesses that it has expertise and maintain an appropriate investment level, to minimize potential risks and losses to the company and country.

(Report Topic: Business Sustainability)

(3) PTTEP should consider its overseas investment options carefully because of their very high cost.

(Report Topic: Business Sustainability)

(4) PTTEP should have a focused theme for social development projects that can create branding of the company.

(Report Topic: Value Creation with Society and Communities)

1.5 Materiality Assessment ^(GRI 102-46)

PTTEP conducted the 2019 materiality assessment on sustainability issues using interviews and surveys of all key stakeholder groups. The issues were then prioritized using 2 criteria: material issues on the company's business operations, and issues that the stakeholders regarded as important and expected from the company. The trends and directions of global sustainability were also considered, in line with the United Nations Sustainable Development Goals (UN SDGs), the Dow Jones Sustainability Indices (DJSI) and material issues for the energy industry. The process of materiality assessment was conducted in accordance with the Global Reporting Initiative (GRI) reporting framework as follows:

(1) Identification

Considered the company's business strategy, enterprise risks, challenges as well as social, business and environmental activities, in conjunction with the stakeholders' suggestions, expectations and interests.

(2) Prioritization

Assessed from the level of significance to PTTEP according to the risk assessment criteria and stakeholders' interests.

(3) Validation

The Management Committee reviewed and approved the material issues for disclosure in the annual Sustainability Report. An external audit was carried out to verify the transparency, accuracy and completeness of the disclosed information.

(4) Review and Report Development

Improved the participation procedure as well as gathering feedback and recommendations from stakeholders to further improve the report to better reflect the stakeholders' issues.



1.6 Materiality Matrix ^(GRI 102-47)



1. Governance, Risk Management and Compliance
2. Increasing Petroleum Reserves
3. Lower Carbon Future
4. Human Resource Preparation
5. Contribution to Community and Society
6. Environmental Management
7. Technology and Innovation
8. Occupational Health and Safety



1.7 Material Issues and Boundaries ^(GRI 102-46, GRI 102-47)

Material Issues	GRI Material Aspects	Report Topic and Significance of the Material Issues	Impact Boundaries ¹			
			PTTEP Internal	PTTEP External		
				Government	Suppliers and Contractors	Society and Communities
1. Governance, Risk Management and Compliance	<ul style="list-style-type: none"> • Compliance • Anti-corruption 	Governance, Risk Management and Compliance <ul style="list-style-type: none"> ▪ Being the key factors that support PTTEP's performance ▪ Strengthening the company's credibility in good governance and business ethics 	•	•	•	•
2. Increasing Petroleum Reserves	<ul style="list-style-type: none"> • Economic Performance • Petroleum Reserves² 	Business Sustainability <ul style="list-style-type: none"> ▪ Adjusting business strategy in response to change to create business sustainability ▪ Having direct impact on PTTEP's turnover as well as value sharing with all stakeholder groups 	•	•	•	
3. Lower Carbon Future	<ul style="list-style-type: none"> • Emissions 	Environmental Stewardship <ul style="list-style-type: none"> ▪ Mitigating social and environmental impact of greenhouse gas emissions ▪ Reducing risks and impact of global warming on PTTEP operations 	•	•	•	•
4. Human Resource Preparation	<ul style="list-style-type: none"> • Employment • Training and Education • Diversity and Equal Opportunity 	Human Resources Management <ul style="list-style-type: none"> ▪ Building a workforce that propels PTTEP towards its goal, addresses business challenges and changes ▪ Mitigating the shortage of expertise and potential successors 	•			
5. Contribution to Community and Society	<ul style="list-style-type: none"> • Economic Performance • Indirect Economic Impact • Local Communities 	Value creation for Communities and Society <ul style="list-style-type: none"> ▪ Responding to stakeholder expectations and operating in accordance with the company's targets on corporate social responsibility policy ▪ Reducing potential impact due to the lack of support from communities around the operating area and from other relevant stakeholders, affecting the company's reputation and social license to operate 	•			•



Material Issues	GRI Material Aspects	Report Topic and Significance of the Material Issues	Impact Boundaries ¹			
			PTTEP Internal	PTTEP External		
				Government	Suppliers and Contractors	Society and Communities
6. Environmental Management	<ul style="list-style-type: none"> • Energy • Water • Emissions • Effluent and Waste • Environmental Compliance • Biodiversity² 	<p>Environmental Stewardship</p> <ul style="list-style-type: none"> ▪ Reducing direct and indirect environmental impact ▪ Affecting the company's reputation, credibility and license to operate ▪ Working toward natural resource and environmental sustainability 	•	•	•	•
7. Technology and Innovation	-	<p>Technology and Innovation</p> <ul style="list-style-type: none"> ▪ Improving capacity and competitiveness as well as supporting business growth ▪ Enhancing business opportunities in response to future challenges 	•		•	•
8. Occupational Health and Safety	<ul style="list-style-type: none"> • Occupational Health and Safety • Project Security and Process Safety² 	<p>Occupational Health and Safety</p> <ul style="list-style-type: none"> ▪ Realizing that safety is fundamental to business operations and is an organizational culture ▪ Minimizing safety impact on employees, contractors, and communities around the operating area as it has direct impact to PTTEP's trust, reputation, and operating costs 	•		•	•

¹ PTTEP assessed direct and indirect impacts of each material issues on relevant external stakeholders.

² Reference from GRI G4 Sector Disclosures – Oil and Gas



1.8 Performance Summary of 2019 Material Issues

PTTEP has set short-term and long-term sustainable development targets for business, social and environmental dimensions and discloses the sustainability performance of our material issues. In 2019, the main progress and achievements on PTTEP's targets and work plan are as follows:

Materiality: 1. Governance, Risk Management and Compliance Report Topic: Governance, Risk Management and Compliance		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> GRC role model of Thai Listed Company by 2022 through the implementation of the 5-year plan Increase GRC Maturity Level 	<ul style="list-style-type: none"> Aligned the work plan with the GRC Maturity Level assessment result by promoting the GRC understanding through communication that links GRC with each work function; improving GRC-related work processes to improve efficiency Improved GRC process relating to an investment decision process, such as M&A, new business and transition, to better serve business expansion Communicated PTTEP's commitment on internal and external GRC operations, such as the Risk A-Ventures campaign, GRC and Blockchain Technology knowledge sharing session, GRC session for 100 relevant personnel in PTT Group, and publish ESG articles in a financial journal focusing on corporate governance in Hong Kong and Asia Improved GRC reporting to PTTEP's management and revised the reporting topics to cover important issues, such as IT security 	

Materiality: 2. Increasing Petroleum Reserves		
Report Topic: Business Sustainability		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> • 5% CAGR Production Growth until 2030 • Maintain Proved Reserve to Production Ratio (R/P Ratio or 1P/Production) at no less than 7 years by 2030 • Unit cost in the top quartile among peers • Maintain return on capital employed (ROCE) at above the industry average • Increase the proportion of natural gas production to be at least 80% of all production 	<ul style="list-style-type: none"> • 15% of CAGR Production Growth • Proved R/P Ratio or 1P/Production is at 7.5 years • Unit cost was at 31.7 USD per barrel of oil equivalent, maintaining PTTEP's competitive advantage in Petroleum E&P industry in Asia • Return on capital employed (ROCE) was 11% higher than the industry average • The proportion of natural gas production accounted for 73% of all production in 2019 • Successful bid, in partnership with Eni, for offshore exploration blocks in the United Arab Emirates, a region known for low operating costs • Signed the Production Sharing Contract (PSC) for offshore exploration blocks in the Gulf of Thailand, Bongkot and Erawan fields, which will increase PTTEP's long-term production and reserves • Successfully acquired domestic and overseas assets. <ul style="list-style-type: none"> - APICO LLC in Thailand: to help drive further the development of the Siphuhorm project and to meet the increased demand for electricity in Northeast Thailand - Murphy Oil Corporation in Malaysia: awarded E&P rights in 2 blocks off the Malaysian Peninsula - Partex Holding B.V. (Partex): having main investment interests in the Middle East • Discovered a large natural gas field in the Sarawak SK410B project • Increased the petroleum reserves, achieved by the final development decision on the Mozambique Area 1 project and Algeria Hassi Bir Rekaiz project 	 

<p>Materiality: 3. Lower Carbon Future Report Topic: Environmental Stewardship</p>		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> Reduce greenhouse gas emissions intensity at least 25% by 2030, compared to the 2012 base year Reduce greenhouse gas emissions \geq 228,400 tonnes of CO₂ equivalent in 2019 	<ul style="list-style-type: none"> Reduced greenhouse gas emissions intensity by 14% compared to the 2012 base year Reduced greenhouse gas emissions by 256,498 tonnes of CO₂ equivalent 	
<p>Materiality: 4. Human Resource Preparation Report Topic: Human Resources Management</p>		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> Improve the competency of employees at all levels on average by 3%, in preparation for organizational changes. Develop performance evaluation system and adopt a 360° employee behavioral evaluation method. 	<ul style="list-style-type: none"> Average employee competency level increased by 4.15% in 2019 Improved digital competency and work process of the employees and executives through the ENTERPRISE* project, such as Talent Game project, iLearn project and Digital Academy project Launched WeConnect system which is an application for performance evaluation and began using a 360° behavioral evaluation method. <p><i>*ENTERPRISE project is the transformation of organization, work process, and organizational culture.</i></p>	

Materiality: 5. Contribution to Community and Society		
Report Topic: Value Creation for Communities and Society		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> • Macro Level: Restore abundance to the Thai seas by setting up Crab and Aquatic Animal Hatchery Learning Centers, build community networks, raise awareness of sustainable fisheries and promote seafood processing social enterprises • Micro Level: Implement social development projects with the objective of building and maintaining a good relationship with stakeholders in the operating areas, to serve their needs through social development projects 	<ul style="list-style-type: none"> • Macro Level <ul style="list-style-type: none"> - Increased the number of aquatic animals with economic value and incomes of fishermen; conservation and sustainable fisheries networks were formed through the Crab Hatchery Learning Centers; and designated 25 marine and coastal resource conservation areas covering an area of 18 square kilometers along the coast - Increased marine biodiversity; generated over 472 million Baht of income for the communities through the H.T.M.S. Underwater Learning Sites project • Micro Level <ul style="list-style-type: none"> - Reduced household expenses and organic waste through the bio-gas project - Supported early childhood learning development; parents earned extra income for their families through the project on early childhood development centers - Promoted and raised awareness about personal hygiene for children through the Parasite-Free School project 	    

Materiality: 6. Environmental Management		
Report Topic: Environmental Stewardship		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> • Achieve zero hazardous waste to landfill by 2020; zero industrial waste to landfill by 2025; and zero total waste to landfill by 2030 • Achieve 100% of produced water reinjection • Achieve zero oil and chemical spill. • Avoid operating in areas at risk from water scarcity and ensure that there is no impact on the community and water users • No-net Loss of biodiversity in protected areas as defined by the International Union for Conservation of Nature (IUCN) and no operations in World Heritage sites 	<ul style="list-style-type: none"> • 0.126% of hazardous waste to landfill, 0.090% of industrial waste to landfill and 0.348% of waste to landfill • Reinjecting 99.9% of produced water • Oil and chemical spill rate at 0.63 tonnes per million tonnes of petroleum production • No PTTEP operations located in areas at risk from water scarcity. • No PTTEP operations in areas of high biodiversity risk and World Heritage sites • Developed Biodiversity Offset Strategy for the Zawtika Onshore Gas Transportation project in the Republic of the Union of Myanmar, located in IUCN protected area, to define effective ways forward to achieve No-net Loss 	  

Materiality: 7. Technology and Innovation		
Report Topic: Technology and Innovation		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> Develop 10 technology projects that can be deployed or commercialized with an increase in overall returns from technology implementation at least 350 million USD by 2024 Develop technologies to support organization sustainability in 3 areas: <ol style="list-style-type: none"> Greenhouse Gas Reduction Circular Economy for E&P Ocean for Life Award 15 patents by 2025. Publish technical papers on technology development and receive national and international academic awards every year. Complete the construction of PTTEP Technology and Innovation Centre (PTIC) by 2021. 	<ul style="list-style-type: none"> Successful technology development projects in 2019: 8 projects at the stage of prototype, 2 projects at the stage of pilot testing, and 2 projects at the stage of deployment Developed clear short-term and long-term technology development plans for 5 core activities of E&P business operations: <ol style="list-style-type: none"> Advanced Exploration Technology Condensate Treatment Technology Decommissioning Technology Unlock High CO₂ Reserve Enhanced Oil Recovery (EOR). Submitted 11 intellectual property applications: 9 patents, and 2 software copyrights; and 1 patent from previous submission was granted in 2019. Published 12 technical papers at international academic conferences; and received 1 award for technology development. Technology Foresight on 2 areas: Core E&P Technology and Non-E&P Emerging Technology. Implemented an online technology development management system and improved the technology management process. Developed and implemented an intellectual property management guideline. Made good progress on the construction of PTIC, currently in the design stage. 	 

Materiality: 8. Occupational Health and Safety		
Report Topic: Occupational Health and Safety		
Target	2019 Progress	SDGs
<ul style="list-style-type: none"> • Lost Time Injury Frequency (LTIF) of employees and contractors is ≤ 0.13 cases per million hours worked in 2019. • Total Recordable Injury Rate (TRIR) of employees and contractors is ≤ 0.77 cases per million hours worked in 2019. 	<ul style="list-style-type: none"> • Lost Time Injury Frequency (LTIF) of employees and contractors was at 0.07 cases per million hours worked in 2019. • Total Recordable Injury Rate (TRIR) of employees and contractors was at 0.55 cases per million hours worked in 2019. 	

2. Business Sustainability

In 2019, PTTEP had launched the company's vision of becoming the "Energy Partner of Choice through Competitive Performance and Innovation for Long-term Value Creation" and a new business strategy "Expand and Execute" in response to the current oil price situation and industry trends where alternative energy and digital technology are becoming more important to the future of the energy industry. The new business strategy aims to enhance the company's competitiveness and support sustainable growth of the company.

2.1 Business Strategy (Expand and Execute)

PTTEP's strategies to execute and create business expansion opportunities for future growth are as follows:

2.1.1 Expand

Strategy to focus growth in strategic investment areas and explore new opportunities in other energy related businesses for long-term sustainability.

(1) Coming-Home Strategy:

PTTEP focuses on investments in Thailand and Southeast Asia which are regarded as the core strategic investment area.

(2) Strategic Alliance Strategy:

PTTEP aims to capture investment opportunities in other petroleum prolific areas together with strategic alliances by mainly focusing on the Middle East, one of the regions with low operation costs.

(3) New Business Investment for Sustainability Strategy:

PTTEP plans to invest in new businesses that emphasize technology and innovation development as well as demonstrate the potential of their research and development (R&D) capabilities in order to support core exploration and production (E&P) business and future investment opportunities related to the energy industry.

2.1.2 Execute

Strategy to increase sales volume of legacy assets and maintain competitive advantage. The main activities are as follows:

- Create full value from existing assets with the emphasis on increasing production from key assets.
- Maintain cost competitiveness through digital technology and organizational transformation.
- Accelerate key development projects abroad, such as the Mozambique Rovuma Offshore Area 1 project and Hassi Bir Rekaiz project by closely monitoring their progress and providing any necessary support.
- Effectively oversee and implement operations at Bongkot, Erawan fields and newly acquired assets during the transition period.

2.2 Implementation Progress of the Business Strategy

In 2019, PTTEP's key highlighted activities of the strategy execution are as follows:

2.2.1 Expand

- PTTEP together with Eni were selected as the successful bidders for exploration and production rights of 2 offshore blocks located in the north-west of Abu Dhabi, the United Arab Emirates, a country located in one of the regions with low operation costs.

- PTTEP signed the Production Sharing Contract (PSC) for offshore exploration blocks in the Gulf of Thailand, Bongkot and Erawan fields. These will increase PTTEP's production and reserves in the long-term.

- PTTEP made further investments in Thailand with the acquisition of stakes in APICO LLC to help drive further development of the Sinphuhorm project and support electricity generation in the Northeast of Thailand.

- PTTEP successfully acquired Murphy Oil Corporation's assets in Malaysia and won the rights for exploration and production of 2 blocks located offshore of Peninsula Malaysia.

- PTTEP successfully signed a Share Purchase Agreement (SPA) to acquire a 100% stake in Partex Holding B.V. (Partex). This acquisition includes Partex's key Joint Venture Assets, such as Petroleum Development Oman (PDO) field.

2.2.2 Execute

- PTTEP made a huge gas discovery in Sarawak SK410B project which paved the way to future developments in the area and subsequently increases reserves in the future.

- PTTEP was able to develop added values from existing assets by; optimizing operations and maintenance program, commencing rigorous infill drilling campaigns and using advanced technologies, such as Hydraulic Fracturing, to increase S1 project's production. In addition, the company has implemented Advanced Seismic Imaging through its Dedicated Processing Center (DPC).

- PTTEP successfully increased petroleum reserves by achieving Final Investment Decision (FID) for the Mozambique Area 1 project and Hassi Bir Rekaiz project.

- PTTEP oversaw operations during the transition periods of Bongkot, Erawan and newly acquired assets as planned by actively engaging all stakeholders to ensure smooth operations during handovers.

2.3 Performances in 2019

2.3.1 Return on Investment

- Return on Capital Employed (ROCE) was at 11% which was higher than the industry's average in 2018.

- Cost per unit was at 31.7 USD per barrel of oil equivalent, which is competitive compared to other E&P companies in Asia.



2.3.2 Business Sustainability

- Proved Reserves to Production Ratio (R/P Ratio or 1P/Production) was at 7.5 years, better than our target which has been set to be at least 7 years.

- The proportion of natural gas production accounted for 73% of production in 2019. PTTEP's target is to increase the proportion of natural gas production to be at least 80% of all production.

2.4 Transformation toward Enhanced Capabilities for the Future

During this time of abrupt changes, adaptability and ability to transform determine how a business will maintain its competitiveness. PTTEP has recognized the necessity of organization and work process transformation to create resilience for any situations, e.g. volatile oil price, digital disruption and energy transition, which will enable the organization to operate with sustainability.

PTTEP has begun its transformation journey under ENTERPRISE project, focusing in 3 main areas:

(1) Organization Transformation: adjust the organization's structure and processes to be more agile, as well as implement personnel transformation program by changing their mindset and behaviors, equipping them with digital capabilities through the Digital Academy and organizing various activities to foster behavior that are appropriate to the future business to all employees.

(2) Digital Transformation: build data foundation, data governance and digital solutions which will enhance capabilities in the areas of advanced analytics, process automation and Artificial Intelligence (AI), and using decision/monitoring dashboard to improve on speed and efficiency in terms of exploration, production, and capacity of petroleum resource development.

(3) New Business: explore new business opportunities alongside the core business to pursue future growth in areas, such as AI & Robotics and natural gas power plants (Gas to Power).

ENTERPRISE project is expected to increase the accumulated values of investments by up to 5 times. The concept and digital technology will drive the organization's development in accordance with 5-year strategy through 64 initiatives across the PTTEP value chain. These initiatives can contribute positively in a number of ways; for example, increase the success rate in petroleum exploration, improve speed and time in terms of business, increase production volume, improve cost efficiency and increase process efficiency.

The continuous transformation is carried out with an aim to create lasting long-term impact of enhancing personnel's capabilities, mindset and creativity along with the organization capability to sustain in the rapid changes in the future.



3. Governance, Risk Management and Compliance (GRC)

PTTEP believes that sustainable business will enable the company to achieve its vision of becoming an Energy Partner of Choice. With this belief, the company has laid out the sustainability framework as a common working approach. This sustainability framework consists of High Performance Organization (HPO); Governance, Risk Management and Compliance (GRC); and Stakeholder Value Creation (SVC), in other words, it is the framework of “Being Smart, Being Good and Being Responsible”.

3.1 Governance, Risk Management and Compliance (GRC)

PTTEP realizes the importance of integrating Governance, Risk Management and Compliance (GRC) together to ensure the effectiveness of its operations and adherence to regulations, rules, policies and ethics, thus fostering confidence among our personnel, from the level of directors and executives to staff members as well as all stakeholders. This approach will drive the company as a whole in accomplishing its corporate goals in a sustainable manner.

With the goal of becoming a GRC role model for Thai Listed Companies by 2022, PTTEP has continuously implemented two GRC strategies. Firstly, the company makes efforts to instill a work culture that recognizes the importance of GRC. This is in line with our *EP SPIRIT* value in Performance Excellence and Integrity & Ethics. Secondly, the company puts in place a GRC system and related assurance processes that will garner overall confidence. The corporate functions that take care of such system and processes include the Corporate Affairs and Assurance Group, which is made up of staff from the Governance, Compliance and Internal Control and the Risk Management Departments. They are responsible for driving the GRC promotion programs throughout the organization under the GRC management system, as well as defining the governance structure, so that it adheres to well laid-out principles of the Three Lines of Defense Model which can be elaborated as follows:

(1) **First Line of Defense:** units responsible for supervising their own work under the appropriate risk management and internal control while fully complying with relevant laws and regulations.

(2) **Second Line of Defense:** units responsible for the overall compliance to the laws, regulations and policies adopted by the organization, along with the regulation of internal policies and rules, and supervision to ensure compliance with those requirements.

(3) **Third Line of Defense:** internal audit unit and external auditors who are responsible for independently inspecting the overall operations of various work systems in both the First and Second Lines of Defense.

PTTEP has stipulated that GRC be part of the company's strategy to drive and support successful implementation of the company's plans and approaches, and the achievement of organizational goals. Therefore, a 5-year plan (2017-2022) has been drawn up to rigorously direct and develop GRC's implementation. This 5-year plan is to be reviewed annually. The company's intended goal, by 2022, is for a sustainable GRC culture, meaning that employees at all levels will accept, understand, and comply with the GRC principles as well as the various work processes to be established in alignment with the GRC principles.

PTTEP has tasked external independent experts to regularly evaluate our GRC's performance, including the GRC Maturity Assessment, which is carried out every 2 years, and assessment of Good Corporate Governance, which is carried out on an annual basis. Additionally, internal control is evaluated based on the framework of the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The GRC performance is also audited by the Third Line of Defense or the Internal Audit Department in accordance with the risk level in each period.

Overall, in 2019, PTTEP had no case of violation of any social and economic regulations.

Highlights of 2019 include the alignment of work plan with the outcome of the assessment of GRC Maturity Level conducted in late 2018. The outcome stressed the need to; increase understanding of GRC among all employees, whereby such understanding can be applied to individual employee's duties and daily operations; ensure that GRC reports cover additional important issues; and lay down guidelines for GRC to ensure proper implementation of newly acquired businesses in 2019. All of these efforts have helped the company to achieve its goals. Some examples of activities are as follows:

- Reviewed GRC activities that were related to key processes, such as investment decisions and transitions following investments in new projects.

- Conducted internal communication that emphasized the linkages between duties and tasks. An example of this was the pairing of GRC with Start-up and Growth Mindset, which provided information and knowledge on risk awareness and risk management, including compliance and good corporate governance, thus demonstrating the integrity of our business operations, as well as emphasizing the company's readiness for the transformation. Modifications to make processes and business procedures more concise and appropriate were taken into account. Apart from this, there was pairing between GRC with Blockchain Technology which provided basic knowledge about Blockchain Technology and explained how GRC was related to such technology, for instance, a data audit was needed to make sure the data in the network system would always be accurate. Therefore, this process was a way to enable employees to pursue the principles further and apply them in daily operations under the individual employees' purviews.

- Conducted a GRC knowledge sharing session with approximately 100 relevant personnel in PTT Group.

- Improved GRC reporting to PTTEP's management and revised the reporting topics to cover important issues, such as IT security.

3.2 Complaint Handling

PTTEP realizes the importance of conducting business in accordance with Good Corporate Governance. The company stipulated that the Board of Directors and Executives need to act as leaders and good examples of best practices. They are to provide suggestions, communicate, and enhance knowledge and understanding regarding PTTEP's Good Corporate Governance and Business Ethics among employees and other related organizations. Any employees with inquiries or concerns about business ethics may raise and discuss them with their supervisors or the Corporate Governance Unit for advice on appropriate actions. At the same time, a person outside the organization can also report an issue via PTTEP's website or via an email addressed to the company's secretary at CorporateSecretary@pttep.com.

Moreover, PTTEP has established its Reporting and Whistleblowing Regulation to set up complaint procedures and to provide protection for relevant parties, so that complaints can be dealt with in an effective, transparent, and fair manner as per international standards. A complainant, whether an employee of the company or external entity, who has observed a behavior or a situation that may be deemed to constitute fraud, misconduct or violation of the laws, regulations and PTTEP Group's policies and rules, may submit a report through email or post to directors, supervisor, Corporate Governance Unit, and Corporate Secretary Division or through the whistleblowing system on the company's website. The Corporate Governance Unit, Corporate Secretary Division is the central entity for managing PTTEP's complaints following the procedures outlined in the Reporting and Whistleblowing Regulation.

In 2019, the company received 7 complaints, all reported through the aforementioned channels. Following an assessment of evidence, three of these were accepted as formal complaints and processed. In two of the cases, no offense regarding fraud or non-compliance with policies, procedures were found. In another case regarding inappropriate behavior of staff has been found to have serious disciplinary offense pursuant to the Human Resource Management Policy and Business Ethics on Human Resources and the offender's contract was subsequently terminated without severance pay.

The Corporate Governance Unit has informed the complainants, the Audit Committee or the Corporate Governance Committee (depending on the case) and the Board of Directors about the complaints that had been processed. The data of past complaints can be summarized in the following table:

Topic	2017	2018	2019
Number of complaints reported	8	10	7
Type of complainant			
- Person outside the organization	4	2	2
- Person within the organization	2	7	2
- Anonymous	2	1	3
Number of issues accepted as a complaint when the issue was considered to have clarity and adequacy of evidence	7	6	3
Number of offenses found	3	4	1
Types of complaints found to be offenses			
- Utilization and preservation of data and assets	-	1	-
- Human resources (such as being late, showing unacceptable behavior)	1	-	1
- Non-compliance with policies, regulations, and work procedures	1	-	-
- Conflict of interest and fraud	1	3	-



3.3 Anti-corruption Measures

PTTEP stipulates an anti-corruption policy as part of the Good Corporate Governance and Business Ethics of PTTEP Group. The most important anti-corruption principle that PTTEP operates under is that the company stands against corruption in all forms and without exception. This involves complying with all laws related to anti-corruption in each area where PTTEP conducts its businesses. Details regarding these anti-corruption measures are laid out in the annual report under Corporate Governance section.

In 2019, all new employees participated in an induction session which included the subject of Good Corporate Governance and Business Ethics of PTTEP Group as well as the anti-corruption measures. Also, issues related to the Good Corporate Governance and Business Ethics of PTTEP Group including anti-corruption measures which were regularly communicated to all management and employees by PTTEP's President and CEO every quarter.

3.4 Risk Management

Businesses today are facing rapid technology transformation. PTTEP's emphasis on environmental issues and compliance with diverse sets of laws and regulations constitute a challenge and a motivation for PTTEP Risk Management Committee at PTTEP Board of Director level and PTTEP Management Committee to improve the organization's processes to ensure that risk management is comprehensive and timely. The company has set up regular monitoring of the progress of related strategic assumptions in order for them to be promptly adjusted in accordance with circumstances. The company's improvement of the Governance, Risk Management and Compliance (GRC) integration under the responsibility of the Second Line of Defense units (based on the Three Lines of Defense Model) has led to comprehensive and effective risk identification and management, covering both the enterprise and operation risks.

PTTEP also places importance on managing risks within PTTEP Risk Appetite Statement in order to achieve the organization's objectives and goals. The company has sought to reduce the likelihood and the impact as well as control the level of impact in the future.

3.4.1 Strategic Risk Management

In 2019, PTTEP attached importance on strategic risk management from defining the Risk Appetite Statement in order to formulate and select strategies that are aligned with the company's vision of "Energy Partner of Choice" and mission. Moreover, the company set up regular monitoring of the changes in strategic risk assumptions that are used as references to formulate strategy, including following up on the progress of mitigation plans and monitoring Key Risk Indicators (KRIs) to protect or reduce strategic risks through timely adjustment in accordance with the rapidly changing situation.

3.4.2 Risk Management Integration and Improvement

To ensure all key risks are identified and in line with the Three Lines of Defense Model principle, in 2019, Risk Management Department integrated GRC by coordinating with related units, especially the units in the Second Line of Defense. For instance, Compliance Unit, to monitor changes in the laws and regulation that may cause new risks or have an impact to existing risks.



In addition, PTTEP is in the process of improving Risk Management System by digitalizing our process to support all related parties who manage risks for their complete and prompt analysis and communication. This systematic development ensures that unknown risks are managed. In 2019, the company improved Risk Dashboard to display risk assessment results on web-based system that supports management and related parties to easily and promptly assess information and manage risks everywhere and every time. Moreover, the company plans to develop Artificial Intelligence (AI) to assist related parties with predictive risk identification in the future.

3.4.3 Managing Emerging Risks to Support Organizational Growth

(1) Disruptive Technologies and their Impacts on the Energy Industry

Today, technological innovations and alternative energy have a significant impact to the energy industry, such as energy storage systems and electric vehicles. With the trends of cost reduction and improved efficiency in renewable energy and electric vehicle businesses, the demands for petroleum are predicted to be significantly reduced. These phenomena may increase the risk and can affect the energy sector business models.

In 2019, PTTEP adjusted its business strategy to accommodate disruptive technologies, through the establishment of "ENTERPRISE" project to drive Transformation in the organization. These transformations include the utilization of digital technology in petroleum exploration and production (i.e. Internet of Things – IoT for data management), organizational transformation, and process transformation to build an agile and efficient organization for expedient decision-making and responses, while cutting costs and natural resources required for operations.

(2) Climate Change

PTTEP recognizes the significant risks and opportunities of climate change that may affect PTTEP's operations in various ways, including; 1) physical damages, such as the damage to our platforms, structures and equipment, or inaccessibility to exploration and production sites due to severe storms and floods; 2) legal issues including carbon tax, or enforcement of stricter climate change related laws and regulations; and 3) the increase of green energy adoption.

PTTEP manages climate change risks with a focus on improving work processes to reduce greenhouse gas emissions intensity by 25% in 2030 (compared to the base year 2012). Moreover, the company continues to support reforestation efforts to absorb greenhouse gas, and offset carbon through various mechanisms, as well as increase its Research and Development (R&D) support on technologies to store CO₂. The company also incorporates with the Thailand Greenhouse Gas Management Organization (TGO) to develop approaches to reduce greenhouse gas emissions under the Thailand - Voluntary Emission Reduction Project (T-VER).

In addition, in order to cope with the above mentioned emerging risks, PTTEP has explored investment opportunities in potential businesses to enhance the company's competitiveness and pave the way for future sustainable growth. The company now focuses businesses in the natural gas value chain, for example natural gas power plant (Gas to Power) and on commercialization of technological innovation projects developed within the company, such as AI & Robotics.



4. Technology and Innovation

PTTEP began as a small petroleum exploration and production company; as a co-venture in a domestic exploration and production project. Over the last 30 years, the company has evolved and grown amidst the ever-changing social and technological contexts; where today's significant challenges are in relation to a low carbon future and energy transition. These challenges will inevitably impact the energy sector in the future.

Hence, PTTEP focuses on ways to enhance petroleum exploration and production which is the main business by increasing petroleum exploration success rates, increasing production efficiency, reducing operating costs and reducing environmental impact, as well as monitoring the development of new energy technologies to prepare for future challenges.

4.1 Technology and Innovation Development

PTTEP believes that technology and innovation development is an integral part in the efforts to enhance the potential for growth and improve the company's preparedness to adapt to changes. PTTEP allocates 3% of its net income each year on technology development, focusing on 4 major discipline areas:

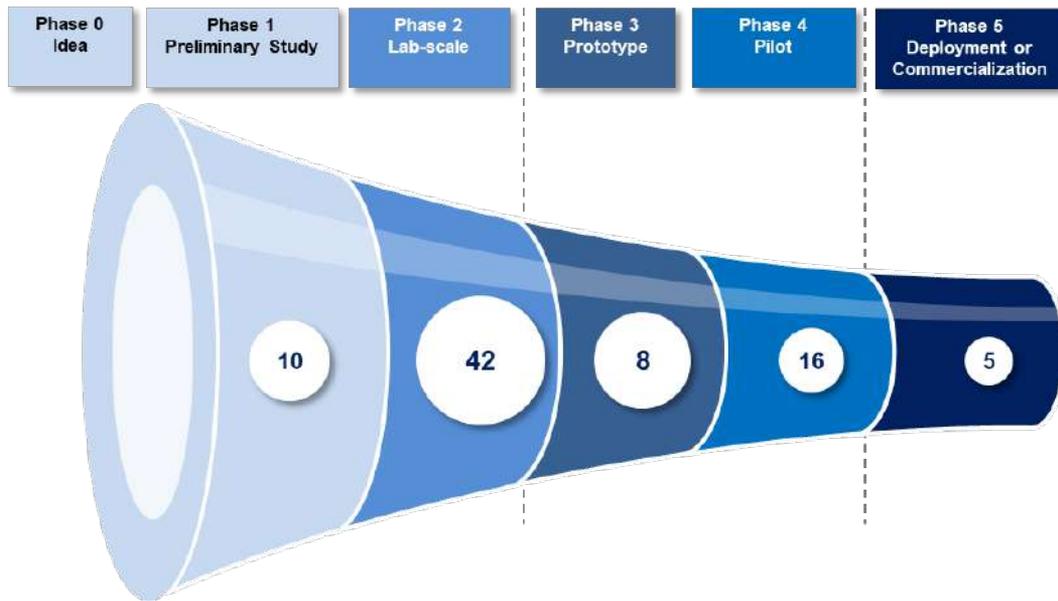
1. Subsurface Technology
2. Engineering and Production Technology
3. Artificial Intelligence and Robotics (AI & Robotics)
4. Future Energy Technology

In addition, PTTEP attaches great importance to expediting technology development in 5 focused groups to the deployment phase, divided by the following objectives:

1. Advanced Exploration Technology
2. Condensate Treatment Technology
3. Decommissioning Technology
4. Unlock High CO₂ Reserves
5. Enhanced Oil Recovery (EOR)

In 2019, there were 81 research and development projects in collaboration with external partners both public and private sectors. All projects were developed in 5 phases namely; preliminary study; lab-scale; prototype; pilot; and deployment or commercialization. An overview of the number of technology development projects in the technology funnel is shown in the graphic.





4.2 Technology and Innovation Development: Targets and Progress

In order to substantially drive technology development projects, PTTEP has determined the goals in 5 dimensions:

1. Execution of technology projects: at least 10 technologies in Exploration and Production (E&P) business are deployed and commercialized with an increase in overall returns from technology implementation at least 350 million USD by 2024.

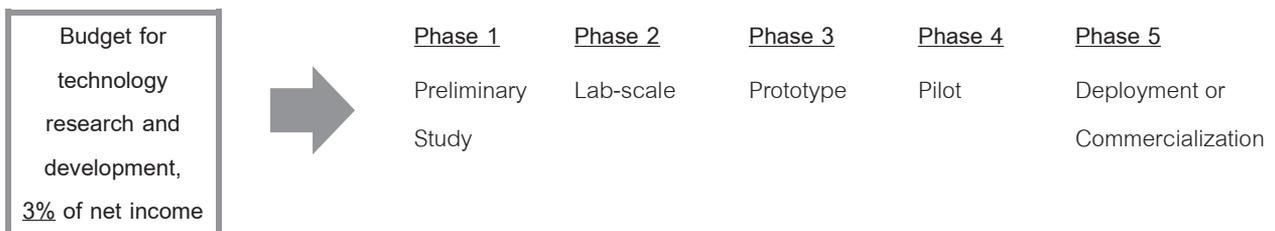
2. Technology development to support the sustainability of the organization: contribute to technology development in areas related to Greenhouse Gas Reduction, Circular Economy for E&P and Ocean for Life.

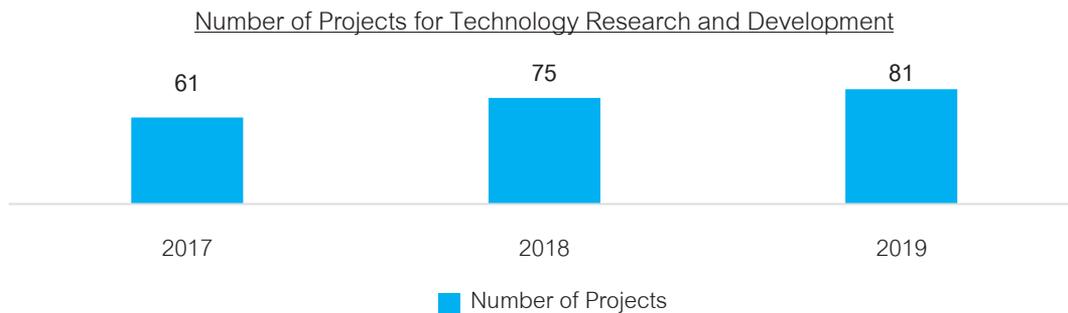
3. Intellectual Property Management: Granted at least 15 patents by 2025.

4. International and domestic research paper publications and awards: publish research papers and receive awards on the result of research and development projects every year.

5. Construction of infrastructure to support technology development: complete the construction of PTTEP Technology and Innovation Centre (PTIC) by 2021.

In 2019, the progress of PTTEP's technology development and innovation projects exceeded the targets set in our roadmap. As a result, the company anticipates earlier adoption of new innovations and products in support of its operation and as new business opportunity. The overall picture can be summarized as follows:





4.3 Outstanding Achievements in 2019

4.3.1 Technology Development for Petroleum Exploration and Production

(1) Objectives

Develop and apply new technologies to help increase the success of petroleum exploration, resulting in increased petroleum reserves, and improve the efficiency of the petroleum production process, as well as reduce costs and losses from unplanned production suspension.

(2) The Success of Ongoing Research and Development Projects

In 2019, PTTEP successfully developed 8 prototypes (Phase 3), and 2 pilot projects (Phase 4). The 2 projects in the pilot phase are worth highlighting:

(2.1) Electromagnetic for Subsurface Fluid Movement Tracking

Project Summary: This technology development involves using electromagnetic waves, based on the principle of electrical induction, to analyze the location of subsurface water and petroleum in waterflood operation. This is one of the processes implemented to increase the production of crude oil. PTTEP has collaborated with Mahidol University, in terms of software development to be used in the analysis of the results and is currently undergoing testing for onshore petroleum production.

Achievements in 2019: Successfully tested the technology in the prototype phase (Phase 3). The results suggest that using electromagnetic wave technology to track the movement of water and petroleum is feasible.

Project Benefits: Increase crude oil production by increasing the efficiency of the waterflood.

(2.2) Low BTU Flare Tip Development

Project Summary: The development of a flare tip that is able to burn low BTU flare gases in order to reduce the loss of assisted gas that need to be used in burning process. The project has been carried out in collaboration with John Zink Hamworthy Combustion, a company with expertise in producing flare tips.

Achievements in 2019: Successfully designed and tested a prototype (Phase 3) of flare tip that can burn flare gases with a low BTU value, as targeted.



Project Benefits: Reduce the amount of assisted gas that would otherwise be needed in the process of burning flare gases which is equivalent to the gas value of 7 million USD per year.

(3) Implemented Projects

In 2019, 2 projects had successfully been developed and implemented:

(3.1) Top of the Line Corrosion Prediction Software

Project Summary: Development of software to predict corrosion in marine petroleum pipelines, to be used to design the petroleum pipelines, and optimize the inspection and maintenance plans.

Achievements in 2019: Successfully implemented (Phase 5) the project. It was used in the designing of petroleum pipelines that had been installed for new wellhead platforms, and was used to improve the pipeline inspection and maintenance plans.

Project Benefits: Reduce the cost of installing petroleum pipelines, and the cost of inspection and maintenance of the petroleum pipelines about 1 million USD.

(3.2) Technology for Seismic Survey Data Conversion, for Petroleum Resource Analysis (Seismic Inversion)

Project Summary: The project involves using data conversion techniques from the exploration of petroleum production sources through the use of seismic measurement to present the production well model which will efficiently assist the analysis of potential petroleum areas.

Achievements in 2019: Successfully implemented (Phase 5) new techniques in evaluating petroleum production sources. It is currently used as a standard method in the work process of the geological staff.

Project Benefits: Increase accuracy in assessing petroleum resources in order to correctly conduct drilling exploration, and reduced cost of hiring external specialist about 1.2 million USD.

(4) Preparation of the Technology Foresight

PTTEP adopted Technology Foresight approach to study technology trends, in collaboration with a consulting firm. The study covers both Core E&P and Non-E&P Emerging Technologies. The company will utilize the results obtained for further planning of its technology development plans.

(5) Intellectual Property Registrations

In 2019, the company has submitted a total of 11 research and technology development intellectual properties: 9 patents, and 2 software copyrights. In addition, there is 1 patent from previous submission which was granted in 2019.

(6) Publication of the Study Results from Research and Technology Development Projects

In 2019, the company presented and published 12 research papers from research and technology development projects, which have been publicized in 7 journals and international technical conferences.



4.3.2 Technology Development to support Corporate Sustainability

(1) Objective

Develop technology to reduce environmental impact in 3 areas: 1) Greenhouse Gas Reduction 2) Circular Economy for E&P and 3) Ocean for Life.

(2) The Success of Projects

(2.1) Carbon Nanotube Project

Project Summary: To achieve the company's goal of reducing greenhouse gas emissions, PTTEP has concentrated on research and development of Carbon Capture Storage & Utilization (CCS & CCU) while working to reduce greenhouse gas emissions from the company's operating activities. For CCU, the company has conducted a study on how to produce carbon nanotubes from flare gas.

Achievements in 2019: Successfully developed and tested the carbon nanotube synthesis process prototype (Phase 3) and was able to produce carbon nanotubes with marketable specifications. The tubes can also be used in the production of various products.

Project Benefits: Flared gas utilization by converting it to a valued product.

(2.2) Drilled Cuttings Utilization Project

Project Summary: The use of rocks and soil from the drilling of onshore production wells for the construction of roads, instead of being disposed by incinerating at the cement plant. This project is jointly developed with the Department of Rural Roads and the Department of Mineral Fuels.

Achievements in 2019: Successfully tested rock and soil samples derived from the well drilling process. It was found that they had appropriate properties to be used as raw materials for building roads. The project is currently in the process of being expanded for pilot testing (Phase 4) in 2020.

Project Benefits: Reduce the cost of raw materials used in building roads by 30%, and also reduce the cost of disposal by an old method by 50%.

4.3.3 Improvement of Technology Development Management

(1) Objectives

Possess an efficient technology development management system.

(2) The Success of Projects

(2.1) Improvement of Technology Development and Intellectual Property Management Processes

In 2019, PTTEP improved the process of technology development management, including the development of online technology development management systems, in order to facilitate and accelerate efficiency in the implementation of technology development projects.



In terms of intellectual property management, the company has developed procedures for managing intellectual property in order to be used as a guideline for intellectual property related issues.

4.3.4 Construction of Infrastructure to Support Technology Development

(1) Objectives

To prepare the necessary infrastructure for technology research and development, from the experimental phase in the laboratory, prototype and pilot testing, in order to support and accelerate the success of technology development.

(2) The Progress of Projects

(2.1) PTTEP Technology and Innovation Centre (PTIC)

Project Summary: In 2019, the company had a plan to establish the PTTEP Technology and Innovation Centre (PTIC) at Wangchan Valley, Rayong province in the area of Eastern Economic Corridor of Innovation (EECi) to prepare the necessary infrastructure that will help expedite technology development.

Project Progress in 2019: The project is currently under design, construction will begin in mid-2020 and it is expected to complete in 2021.



5. Human Resources Management

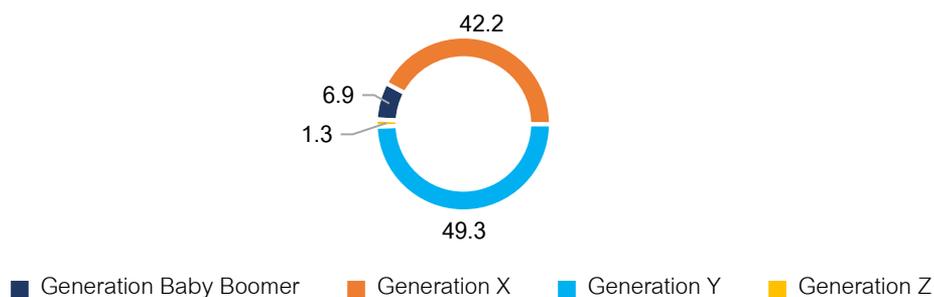
PTTEP continues to treat all of its employees equally, promote a happy and safe work environment, as well as inspire and motivate its employees to improve their capabilities and performances. In 2019, the company revised its vision to become the Energy Partner of Choice. To achieve this vision, the company needs to ensure that our core values (*EP SPIRIT*) are fully adopted to ensure collaboration among staff at all levels.

One of the key stakeholders that drive PTTEP forward is its staff. Our company is committed to support good and high-performing staff so that they can continue to and develop their career to the best of their potentials as well as to ensure close engagement among our staff. PTTEP uses several channels to communicate to its staff, such as the quarterly CEO's Talk sessions in the Town Hall Meeting format. During these sessions, digital tools are implemented to allow for two-way communication between staff and the top management. Comments from staff are seriously considered to ensure that staff get their responses directly from the management team. Staff can also raise comments through their representatives in welfare committees at all operating sites. For misconduct reports and complaints, any individual staff may raise their concerns directly to their supervisors, HR Line Partners, Corporate Secretary, or through cghotline@pttep.com. All reports will be kept confidential as stated in Corporate Governance regulation which also clearly defines actions to be taken and follow-up procedures.

5.1 Inspire, Attract and Retain Capable and Ethical Employees through Technologies

PTTEP recognizes the emerging trend in the labor market. There is an increasing proportion of Generation Y and Generation Z employees. The company has created the Digital Center of Excellence (DCoE) to propel PTTEP into the digital age. Human Resources (HR) Strategy has also been adjusted to meet the lifestyle of the new generations. In 2019, the company started using "WeConnect", an application that is based on SAP-SuccessFactors platform, to allow staff to get in touch with Human Resources (HR) information from any devices, anywhere.

Staff Age Distribution 2019 (%)



In addition, WeConnect also allows PTTEP to implement 360° behavior evaluation, based on EP SPIRIT model (E_xplorer, P_assion, S_ynergy, P_erformance Excellence, I_nnovation, R_esponsible for Society, I_ntegrity and Ethics, T_rust and Respect). The evaluation enables staff to experience various perspectives that benefit personal developments.

In order to attract a new generation of employees, PTTEP has also widened recruitment channels to popular online platforms, such as LinkedIn and Facebook. In 2019, 45% of successful candidates came through Facebook and LinkedIn. Additionally, the company developed an interactive application that provides information for those who want to learn more about PTTEP's businesses. The application can also help evaluate whether prospective candidates' behaviors and interests, and values of the company match before they start applying. This helps enhance the image of PTTEP as a digital organization.



5.2 Human Capital Development

In 2019, PTTEP restructured its organization to prepare for its future growth in both existing Exploration and Production (E&P) and new businesses by combining similar roles and responsibilities together in order to streamline processes from end to end. The company also adjusted the chain of command to be more appropriate, agile, and effective. Work processes and culture were improved to encourage staff at all levels to have the opportunities to make decision based on their responsibilities and to work as a team to achieve the common goal (One Team, One Goal). To support successful business and organizational transformation, the company started developing employees' capabilities by reviewing their soft skills and leadership competencies and setting up the Digital Academy to equip employees with digital literacy and an agile way of working.

The data shows that, in 2019, the total expenses for training and employee development were 8,615,098 USD and the average hours of employees attending training and development programs were 43 hours/employee/year. Additionally, the company provided 24 scholarships, with the total amount of grant amounting to 777,763 USD, for high-potential individuals to further their studies both in Thailand and overseas.

5.2.1 Human Capital Development for Management

(1) Strong Leadership for Sustainable Growth

PTTEP has succession plans in place. The company continues to provide its high-potential staff with preparation and training for future management positions. PTTEP aims to have the ratio of 1.5 : 1 ratio in terms of immediate successors to management positions. Given this, the company has arranged for a review of its list of potential successors on an annual basis to mitigate risk and potential impact from retirement and resignation at the management level. Furthermore, the company has implemented talent management programs to enhance competencies of potential successors. In 2019, key program includes:



(1.1) **EP-LEAD Program** has been organized annually since 2013 with the aim of developing capabilities of the next generation leaders by providing them with the necessary knowledge and skills in business management, effective leadership, and fostering management networking. The program has strengthened the organization and motivated high-potential employees to pursue their career advancement. In 2019, one session of EP-LEAD I was conducted for 29 staff members who were considered to be potential Section Managers.

(2) Continuous Development of the Management to Support Transformation

PTTEP continues to organize regular trainings to enhance leadership capabilities to drive the organization's vision, mission, values and organizational cultures. Activities organized in 2019 were also aimed at supporting transformation project with key programs including:

(2.1) **Leadership in Performance Management and Team Management (Power in Me)***: Building visionary leadership through self-development. The rationale of the project is to assure that an individual has choices and can train oneself to adopt new behaviors that contribute to sustainable successes. The individual can also act as a role model and support other team members in order to strengthen work relationships and trust within the team. In 2019, 20 staff attended the program.

(2.2) Management Development to Support Transformation, such as:

Develop leaders' capabilities that are necessary to manage organizational transformation with new set of soft skills (**Adaptive Leadership Competency**) which consists of 15 key leadership competencies cover 4 critical areas: Navigate, Empathize, Self-Correct, and Win-Win. The new set of soft skills has been communicated to the management. It would be used as a basis for designing management courses from 2019 onwards. Initial assessment is to be done in 2020. In 2019, 38 management were involved in the program.

Develop courses based on new leadership competency set, for instance: "Empower You", a course that seeks to develop mindset and expected behaviors at the management level in order to stimulate and support a culture that drives sustainable transformation by being role models and supportive team members. Different tools have been introduced in this course for effective execution, such as a mobile application, assessment of mindset and behaviors before and after coursework by supervisors, and follow-up sessions. In 2019, 53 management attended this course.

(2.3) **PTT Group Leadership Development Program (GLDP) and Government's Executive Development Programs**: the company nominates leaders to rotate among PTT Group flagship companies and participate in the PTT Group Leadership Development Program and government's executive development programs. In 2019, 16 management attended the following courses/programs.

- PTT Leadership and Learning Institute (PLLI): Leadership Development Program 1-3
- Ministry of Energy: Thailand Energy Academy, Executive Energy Management Program
- Ministry of Finance: Financial and Fiscal Management Program for Senior Executive
- Royal Thai Navy: Naval War College Course

**To develop this program, PTTEP analyzed feedback from employee engagement surveys and the evaluation of 360° performance appraisal.*

- Office of the National Anti-Corruption Commission: Anti-Corruption: Senior Anti-Corruption Strategy Executive Program
- Capital Market Academy: TLCA Executive Development Program, CGD courses

5.2.2 Human Capital Development for Employees

(1) Develop employees' capabilities to support PTTEP's business expansion and acquisition of new assets

In 2019, PTTEP continued to enhance competencies of staff in petroleum exploration and production to support constant business growth and to remain competitive in the industry. PTTEP puts its development focus on staff who are working on delivering exploration success and joint venture management to align them with the vision of becoming an "Energy Partner of Choice."

In addition, PTTEP's acquisition of Murphy Oil Corporation (Malaysia) in 2019, opens up opportunities for the company to develop capabilities of its staff in Deepwater Operations in addition to the current MD-7 Project in the Republic of the Union of Myanmar. Moreover, PTTEP is still actively looking for quality personnel outside the company to help support the work that needs special expertise.

(2) Staff Development and Competency Review to Support Transformation

PTTEP has reviewed leadership and employees' soft skills and competencies required to support business and organizational transformation. Since 2018, PTTEP has established the 'Digital Academy' to equip employees with digital literacy, knowledge and skills related to Agile Ways of Working.

In addition, the company has developed courses for staff. Worth highlighting is "Delighting Me". The course is aimed at developing mindset and expected behaviors at staff level to be supportive of the corporate culture in the context of sustainable transformation. The aim of the course is for the staff to realize that they have significant roles to play in organizational transformation. In 2019, 27 staff attended this course.

5.3 Overall Competency Development

Every year, PTTEP utilizes online Key Performance Indicator (KPI) assessment or Performance Development Appraisal (PDA). All members of staff and the management have to go through the assessment in the designated timeframe and format set by the company. The company has also been assessing staff competency annually since 2010 by using online application called Intelligent Competency Management System (iCMS). Each staff member is assessed against the assigned Job Competency Profile (JCP) that matches with his/her assignments. The results from the assessment are used to develop Individual Competency Development Plan (ICDP) following the 70-20-10 development model. The proportions refer to learning and development through the On-the-Job Assignment (OJA), coaching and mentoring, and formal training, respectively. In 2019, the number of employees that went through the process was 1,685 amounting to 100% of those having ICDPs. The average competency increased by 4.15%, higher than the 3% target. Moreover, the average competency of technical employees which constitute the core group of employees increased by 3.14%, higher than the 2% target. Additionally, the direction of staff development is to be in alignment with PTTEP's strategy.



5.4 Strengthening Organizational Culture

PTTEP organized various programs to increase employees' engagement and strengthen the *EP SPIRIT* culture in everyday life. More than 240 employees from 52 business units were nominated as *EP SPIRIT* Transformers to promote and drive the *EP SPIRIT* values in their own work through various communication channels and activities, with the aim of building a good and collaborative work environment in the organization. These activities have been strongly supported by PTTEP management at all levels.

In 2019, PTTEP introduced the 360° evaluation as a tool to assess staff behaviors using the *EP SPIRIT* model. The criteria for assessment have also been revised to ensure that the assessments are accurate, in alignment with PTTEP's direction toward transformation, and able to indicate actual behaviors of staff.

In addition, as PTTEP is expanding in other countries, *EP SPIRIT* core values are becoming more significant than ever. The company is now implementing *EP SPIRIT* at our key international assets, such as Malaysia asset that we acquired this year, and asset in the Republic of the Union of Myanmar where the company is starting to elevate the core values to a higher level.

The year 2019 was also the year when PTTEP attached high priority to prepare the organization for transformation in the digital era, including transforming its corporate culture through a project called "ENTERPRISE". The project aims to transform PTTEP to become a competitive and adaptive company amidst continuous changes in the industry. With the introduction of the above project, Employee Engagement survey was not carried out in 2019. Instead, it will be conducted in 2020 to measure the engagement of employees following the ENTERPRISE project. The company is confident that the overall staff engagement level will be satisfactory. The score for overall staff engagement with the company stood at 66% in 2018 with a low voluntary turnover rate of 3.70% and 2.88% in 2018 and 2019 respectively.

PTTEP continues to enforce equal employment practices in accordance with the company's human rights policy. The company values its personnel highly as they constitute the key asset that drives the business forward. This is why the company has devoted its efforts into systematic staff development. The company also promotes equal treatment and follows human rights policy of the United Nations Guiding Principles on Business and Human Rights (UNGP) and the Declaration on Fundamental Principles and Rights at Work of International Labor Organization (ILO). The company has also joined the United Nations Global Compact (UNGC) which requires periodic reports and supporting evidence on the company's implementation, protection of human rights, and impact on stakeholders. The company also supports Universal Declaration of Human Rights (UDHR), rejects child labor and ensures that the company follows the laws and regulations of every country that we operate in. As well as restrictions on labor laws in each country in which the PTTEP Group operates by treating all employees equally, not discriminating on reasons of origin, race, gender, age, skin color, religion, disability or any other conditions that are not related to work. The company seeks to provide fair employment conditions with an opportunity to progress fairly. Additionally, PTTEP ensures that there is no threat, intimidation or violation of personal rights and freedoms between executives, employees or related persons.

In 2019, the proportion of female employees was at 33.7% of total employees and the proportion of female executives in management position was 25% which is higher than the Energy industry's average. Additionally, the company continues to provide monetary grants to support projects that employ 38 disabled employees to work in communities or social enterprises.

6. Supply Chain Management and Vendor and Supplier Development for Sustainability

Supply chain management does not only prevent negative impacts on the business and the company's reputation, but it also helps to improve work efficiency, transparency, and create shared values for both the company and our suppliers. The company has a comprehensive supply chain management framework that begins with the initial process of vendor and supplier selection, to supplier risk management on Environmental, Social and Governance (ESG) issues, and supplier relationship and capacity building. Across these processes, the company applies digital technology to help improve our management efficiency and ensure that supply chain management at each stage is consistent and systematic.

6.1 Sustainable Procurement and Contract Policy

PTTEP has put in place the PTTEP Vendor Sustainable Code of Conduct which governs the conduct of vendors on issues relating to their business operations and ethics, human rights, occupational health and safety, as well as environmental expectations. This, under the company's new vision of becoming an "Energy Partner of Choice through Competitive Performance and Innovation for Long-term Value Creation", enables the company to achieve sustainable values for all stakeholders, and reduce the risks associated with PTTEP's procurement and contracting activities. In 2019, significant improvements relating to procurement and contracting can be outlined as follows:

6.1.1 Green Procurement:

Green Procurement is one of the components under PTTEP's Supply Chain Management Policy. Beginning in 2017, the company developed the 'Green Procurement Criteria' for each of the work categories, which were then certified by Thailand Environmental Institute (TEI), as well as an approach to evaluate the environmental considerations of procurement practices. Until 2019, the company has formulated Green Procurement Criteria for a total of 27 work categories which constitute 11% of total procurement value. The goal is to increase that number to 30% by 2022.

Green Procurement	2018	2019	2020 Target
The value of Green Procurement (Million USD)	44.5	96*	-
Percentage of the value of Green Procurement (Compared to the total procurement value)	4	11	13

*The value of procurement that complied with Green Procurement Criteria covered by 27 work categories.

6.1.2 Local Content:

To support local businesses, PTTEP encourages procurement from our local suppliers who have the capability of developing products and services through the use of various innovations, to make sure that the quality of their products and services are in line with PTTEP's standards and requirements. Best practices, recommendations and safety measures have been communicated through regular meetings with suppliers. In 2019, the percentages of local procurement of products and services in various countries where PTTEP operates in were as follows:

Local Procurement of Products and Services* (Percentage)	2017	2018	2019
Thailand	61	66	72
The Republic of the Union of Myanmar**	14	27	30
Australia***	79	46	-
Canada	99	100	95
Algeria	51	62	78
Others	98	100	100

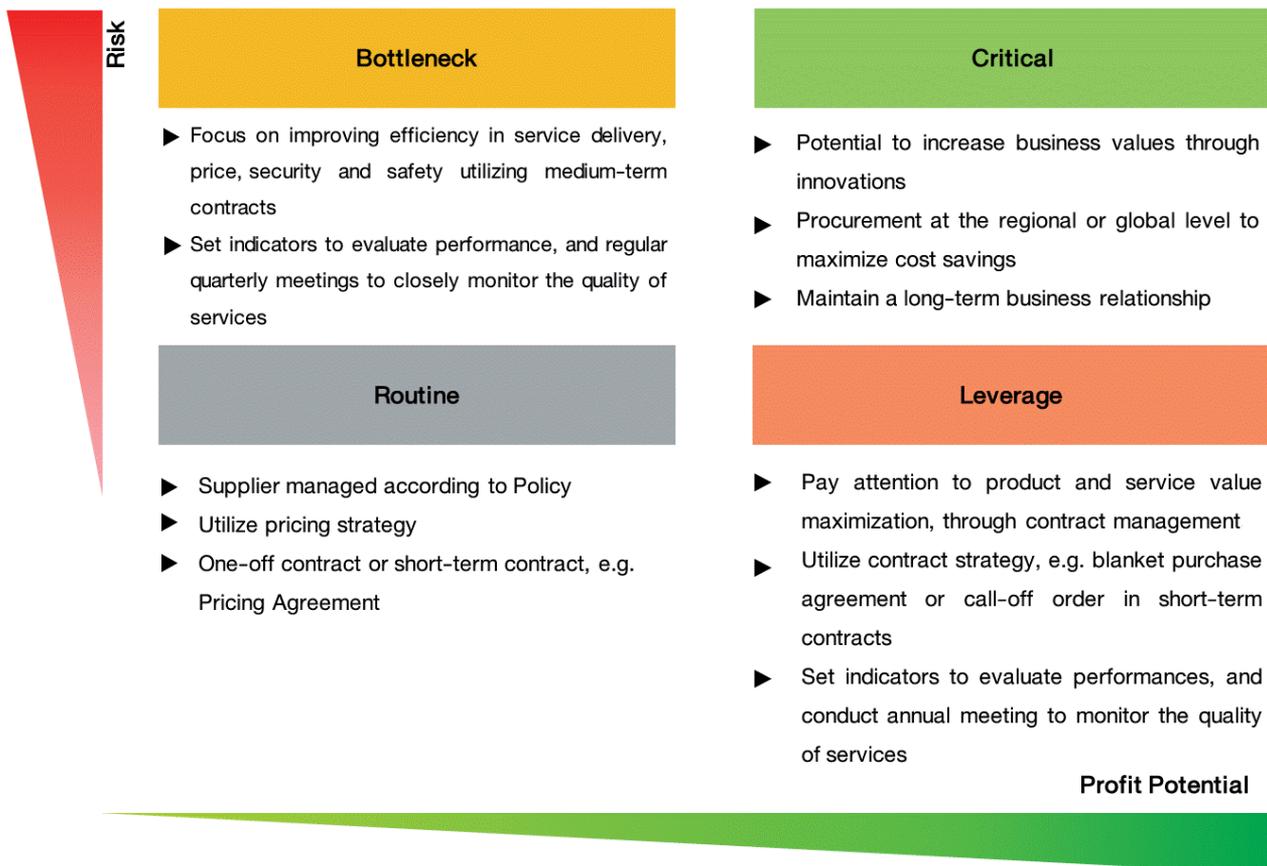
*Focusing on significant locations which are the main countries for PTTEP's operations.

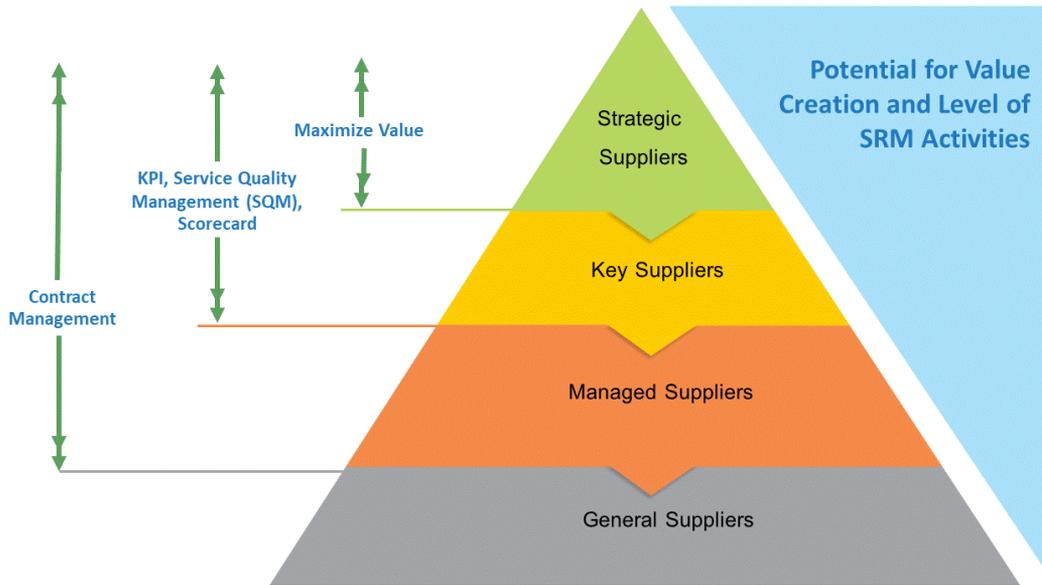
**Number of local suppliers in the Republic of the Union of Myanmar is lower than other countries due to a lower number of qualified suppliers.

***In 2019, PTTEP had no operations in Australia.

6.2 Category Management

PTTEP adopts category management to products and services based on their values and risks, and regularly conducts analysis of markets and internal demands. This category management is carried out to determine the most efficient procurement strategy taking into account the capital, punctuality, compliance to standards, and the degree of ESG integration in the procurement processes. All of these measures are to ensure that our approach to category management aligns with the company's sustainable development policy, as demonstrated by the following illustration:





Furthermore, PTTEP’s approach to category management is also used to categorize suppliers for Supplier Relationship Management (SRM), and to improve procurement processes so that they are suited to each type of product or service group.

As of 2019, PTTEP had the following procurement value in each country:

PTTEP’s 2019 Suppliers	Procurement Value per Country (Million USD)
Thailand	965
The Republic of the Union of Myanmar	270
Canada	5.5
Algeria	1.8

PTTEP has 2,573 tier 1 suppliers in Thailand who represent a total procurement value of 965 million USD, and are divided into the following product and service categories:

Category	Number of Suppliers	Procurement Value (Million USD)	Percentage
Drilling	163	196	20
Logistics	175	214	22
Wellhead platform construction	2	54	6
Maintenance	494	61	6
Others	1,739	440	46
Total	2,573	965	100



PTTEP has 27 critical suppliers, constituting 1% of all suppliers, and accounting for 334 million USD in procurement spending, or 35% of the total procurement spending. In addition, in 2019, PTTEP conducted an assessment of non-tier 1 suppliers through a questionnaire and found that 56 suppliers were critical non-tier 1.

6.3 Quality, Transparent, and Accountable Procurement

PTTEP increased the portion of our vendors secured through the bidding process to 83% of procurement spending in 2019 in order to improve our opportunities of identifying quality vendors. This would not only open the door for capable vendors to propose their products and services that align with the company's needs, but it would also help to reduce the company's costs.

Moreover, the company has determined a vendor control and audit process to ensure that vendors are complying with anti-corruption policy, standards, contract agreement and Security Safety, Security, Health and Environment (SSHE) standards.

6.3.1 Significant Progress in the Sustainable Procurement Process

(1) Fair Competition:

Carried out procurement activities while promoting competition in order to create transparency and provide opportunities for fair competition. Furthermore, the company is committed to ensure that our work complies with relevant laws, such as the Government Procurement and Supplies Management Act B.E. 2560 (2017), and verified that our processes aligned with the public sector's management quality criteria as well as all regulations under the new Production Sharing Contract (PSC)

(2) Supplier Selection:

Adopted a weighted technical and price scoring method in the supplier selection process with a view to engage good-quality suppliers at competitive prices through a process that is transparent and verifiable. Furthermore, PTTEP is required, under the Production Sharing Contracts (PSCs), to produce annual master procurement plan, determine procurement strategy, and summarize contract awarding results to submit either for the approval or the notation of the Department of Mineral Fuels (DMF). This is part of the process of transparent and accountable supplier selection process.

(3) Vendor Collaboration Initiatives:

Continued to develop an effective supply chain management and supported vendor collaboration initiatives to maintain a good relationship with vendors. Meetings were held with vendors in the critical product and service categories that in line with our vision of becoming an Energy Partner of Choice, e.g. Offshore Drilling Rig and Oil Country Tubular Goods, in order to communicate company policy and direction as well as receive feedback from vendors. The objectives of the meeting were to enhance, improve work efficiency, and foster collaboration between PTTEP and vendors. The company also organized management visits to potential vendors' operational premises in order to seek cooperation from prospective vendors.



6.3.2 Major Developments in the Contract Management

(1) Communicating the Vendor Sustainable Code of Conduct

PTTEP attaches importance to communicate to cooperate with suppliers through the fostering of an understanding of the company's determined standards and strategies. This will help our suppliers to fully comply with the company's expectations, as well as develop their own capabilities, advance their businesses, and work together as a team with PTTEP to reach common objectives.

In 2019, the company communicated our supply chain management policy and guidelines through regular meetings with contractors to explain and foster a clear understanding regarding work standards and regulations as well as recommendations to enhance efficiency.

(2) Supplier Audit

Established supplier management and audit measures to make sure that suppliers are complying with international requirements, for instance, American Petroleum Institute (API) standard for Oil Country Tubular Goods (OCTG), Oil Companies International Marine Forum – Offshore Vessel Inspection Database (OCIMF-OVID) standard for marine vessel service providers, and Good Manufacturing Practice (GMP) standard for food and catering service providers. PTTEP's requirements and the Vendor Sustainable Code of Conduct were communicated through online assessment questionnaire (Vendor Management System) during vendor pre-qualification process to let vendors respond to required standards prior to signing of contracts with PTTEP. Several other issues also need to be taken into account, including assessment of the capabilities of the suppliers' production in maintaining the quality of products and services, and their adherence to the company's Vendor Sustainable Code of Conduct and improvement in the sustainability capability in their respective organizations. Examples of supplier audit practices include; Environmental, Social and Governance (ESG) On-site Audit and Key Supplier Site Visits. PTTEP conducted on-site audits with 13 suppliers in 2019.

6.3.3 Sustainability in the Supply Chain

- Year 2017 - 2019, PTTEP conducted supplier risk assessment on 2,573 tier 1 suppliers (100%) and 46 critical non-tier 1 suppliers (82%)

- The company has increased on-site audits to cover 13 Tier 1 suppliers, including during pre-qualification and environmental, social and governance (ESG) assessments.

- 100% of PTTEP's 108 new suppliers in 2018 were screened using business capability, environmental social, and governance (ESG) assessments, human rights, and labor rights criteria.

- 100% of sustainability high-risk suppliers audited in 2018 underwent corrective actions and passed the follow-up audits with good and excellent levels, resulting in no further corrective actions.

- 100% of sustainability high-risk suppliers audited in 2019 passed the ESG On-site Audit with good and excellent level resulting in no corrective action required.



6.4 Inventory Management to Reduce Logistics Costs

To maintain the company's inventory balance at an optimal level, PTTEP has implemented inventory control by focusing on Bongkot, Arthit, and S1 projects, whose combined inventories constitute 93% of the company's total inventory value. Following this, PTTEP was able to reduce our inventory value by 18.8% from 2018's year end total value. Significant progress on inventory management can be summarized as follows:

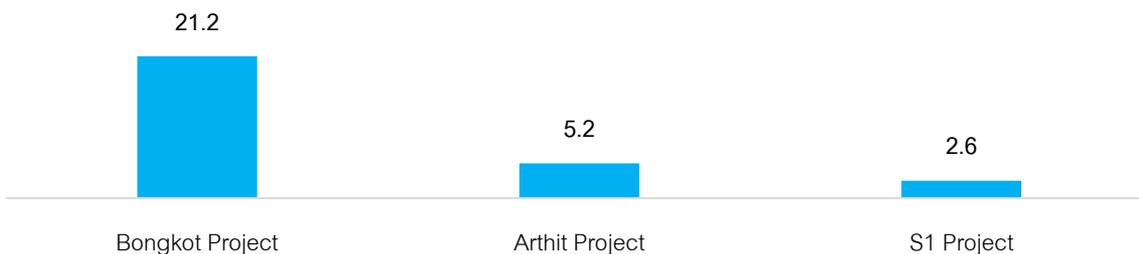
(1) **Conduct regular reviews of inventory management**, from the design, classification, procurement, storage, issuance and write-off stages, so that the process is efficient and aligns with the company's internal controls and related government regulations.

(2) **Optimize the inventory balance so that they are suited to actual needs**, in turn minimizing the overall quantity of materials in stock and the consequential costs from materials taking up the storage space.

(3) **Expand the material tracking information system** to identify the left-over materials or used materials that still retain their condition after utilization in operations and can be reused – thus bring them back into the inventory. This will directly deliver benefits to the company by reducing stock replenishment lead time and production cost.

(4) **Proactively assess the obsolescence or deterioration of material** to reduce non-productive space and cost in the warehouse. Following the application of intensive controlling and writing-off on inventory management, consequently the value of obsolete or deteriorated materials to be reserved to write-off amounted to 29 million USD in 2019.

The value of obsolete or deteriorated materials to be reserved to write-off (Million USD)



Apart from managing the inventory, PTTEP also carries out various projects that aim at increasing the efficiency of procurement practices which bring about a positive impact on our operational capital, safety, and the environment. An example of such projects is the improvement on efficiency of marine transport through two approaches:

- The company improved its process and controlling system for increased efficiency and cost reduction in logistics. For example, attempts to improve the utilization of cargo deck space on vessels which in 2019 achieved an average of 88% of the total vessel deck space, and reduction of the use of marine gas oil. This in turn reduced greenhouse gas emissions by 39,104 tonnes CO₂ equivalent.

- The company continued the 'Smart Marine Model' project in the Republic of the Union of Myanmar, which uses the Centralized Vessel Utilization Management approach. This helped the company conserve fuel use by 2.07 million liters, or 6,368 tonnes CO₂ equivalent in greenhouse gas emissions reduction.



Progress	2017	2018	2019
Number of vessel trips between the Petroleum Support Base in Songkhla province and the petroleum exploration and production sites in the Gulf of Thailand (Number of trips per month)	27	22	17
Vessel storage use per trip (Percentage)	82	89	88
Greenhouse gas emissions reduction (Tonnes CO ₂ equivalent)	51,974	40,718	39,104

In addition, PTTEP has applied digital systems to supplier management. These do not only help in increasing efficiency, but they also manage risks in a more comprehensive manner. PTTEP has digitized our operational systems in various ways based on the framework of ENTERPRISE project to transform the organization and work processes, covering the supply chain management process from the procurement and contracting stage to the stage of purchasing and delivering products and services.

With regards to 2020, PTTEP will focus on consolidating our supply chain management systems and processes by increasing analyses of supplier data, the value chain, and external information, and integrating them into the company's system. Plans are also focused on connecting supply chain processes from procurement planning to logistics and service payments in order to increase flexibility and better accommodate electronic procurement.

6.5 Supplier Relations Management

PTTEP manages our suppliers by monitoring and conducting audits on supplier performance to make sure that suppliers are adhering to the standards and agreements set out in their contracts, and are also complying with PTTEP SSHE standards. All suppliers understand and accept the PTTEP Sustainable Vendor Code of Conduct. PTTEP arranges SSHE Contractor Forum on an annual basis in order for it to become a channel to communicate the company's policies on SSHE and procurement. Moreover, it can enhance good mutual relations among suppliers and the company. In 2019, over 60 companies of PTTEP's suppliers and contractors attended the forum.



7. Occupational Health and Safety

7.1 SSHE Strategy

PTTEP's Safety, Security, Health and Environment Management System (SSHE MS), is developed to serve SSHE Policy, and our Corporate Vision and Strategy. The SSHE MS aims to control the risks posed by PTTEP internal operations, focusing on ensuring a safe working environment, prevention of work-related accidents and injuries, as well as environmental impact. It is aligned with the International Association of Oil & Gas Producers (IOGP) as well as other international standards, such as ISO 14001 and ISO 45001.

Safety is a core value for PTTEP operations. Our goal is to achieve zero accidents (Target Zero) by embedding a culture of proactive safety, security, health and environment, with an emphasis on the process safety and personal safety of our employees and contractors in all of their operational activities. The adopted SSHE MS is in line with SSHE Policy and complies with international standards, to ensure that everyone who works with us return home safely, and to prevent major accidents as well as environmental impact affecting our stakeholders.

The 2019 SSHE strategy focused on promoting a culture of sustainable SSHE, promoting SSHE leadership in all levels, raising the standard of the SSHE management system and process safety, and strengthening contractor management and occupational health management.

In addition, the company has put in place the annual SSHE internal audit plan, which monitors SSHE MS implementation, including external audits for certification in accordance with applicable international standards such as ISO 14001 and ISO 45001. In 2019, 35 SSHE audits were carried out at the corporate level. PTTEP activities and SSHE management systems conducted by employees and contractors were both internally and externally audited (or certified) by 100% and 89% respectively.

7.2 Embedding Safety Culture

A culture of safety is firmly embedded in all of PTTEP operations, which contributes to improving our safety performance and achieving the goal of being a Target Zero organization. Although accidents and incidents still occurred, the company remains fully committed to strengthening the safety culture, focusing on the safety of personnel and SSHE leadership.

In 2019, the company developed and promoted the PTTEP SSHE Leadership Program for frontline supervisors through the 2019 training programs for employees and contractors.

A robust safety culture begins with competent operators. As such, the company has organized safety training sessions for our employees and contractors as follows:



Program or Course	Number of Training Sessions	Number of Participants (Including Contractors)
SSHE Leadership for Frontline Supervisor	4	105
Fundamental Risk Assessment and Job Safety Analysis (JSA): Train the Trainers	4	32
DROPS: Train the Trainers	1	29
Safe Lifting Operation Training	17	478

PTTEP has developed tools that promote safety culture, such as Safety Observation & Communication Card (SOC) and/or Hazard Reporting Card (HRC). These tools primarily focus on the observation and detection of unsafe behaviors and unsafe working conditions, with the aim of eliminating and/or reducing risk in the workplace. PTTEP empowers all of its employees and contractors to “Stop Work” when unsafe conditions or behavior is detected.

7.3 Robust SSHE Management System

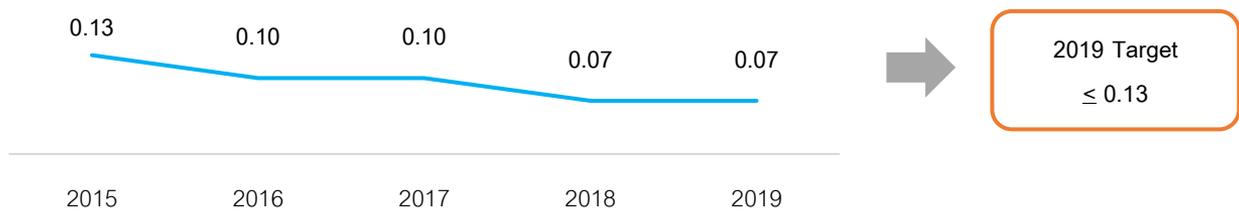
7.3.1 Personal Safety

PTTEP believes accidents are preventable and “Target Zero” or zero accidents is attainable. This conviction is repeated and cascaded down from top management to all employees and contractors. Therefore, PTTEP emphasizes promoting a culture of safety in every stage of the work process. The company’s SSHE policy and management system were designed to meet relevant international standards, to manage workplace risks and ensure that everyone working with PTTEP returns home safely.

(1) Personal Safety Performance

Our continued commitment to improve SSHE performance over the past decade has resulted in a lower Lost Time Injury Frequency (LTIF) and Total Recordable Injury Rate (TRIR) in 2019 when compared with the 2018 performance.

Lost Time Injury Frequency (LTIF) - Company and Contractor
(Cases per million hours worked)



Total Recordable Injury Rate (TRIR) - Company and Contractor
(Cases per million hours worked)



7.3.2 Transportation Safety

In 2019, the company introduced new safety targets, namely Motor Vehicle Incident and Marine Vessel Incident. Awareness on transportation accident prevention is promoted for all PTTEP transportation activities, including the company's and contractors' vehicles and vessels.

Mode of Travel and Transportation	2019 Target (Number of Cases)	2019 Result (Number of Cases)
Motor Vehicle Incident	2	1
Marine Vessel Incident	1	0

7.3.3 Process Safety

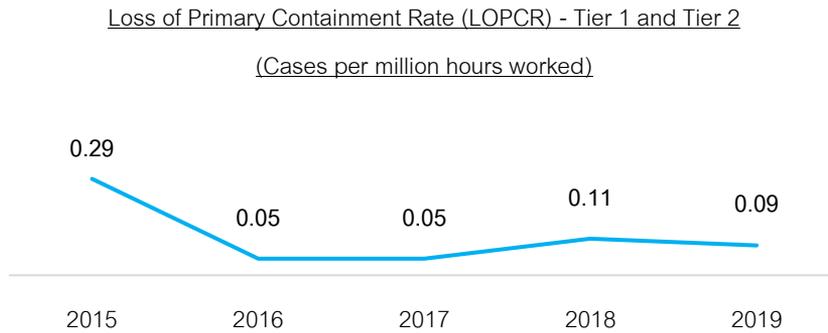
PTTEP's mission in supplying oil and gas to meet the country's energy demand inevitably involves the risk of spills that could result in Major Accident Events endangering human lives, the environment and property.

A process safety incident is a leak or spill of hazardous materials in the production process. Process Safety Management involves the safe containment of hazardous substances in production wells, pipelines and tanks, to prevent harm to personnel or the environment. PTTEP's Process Safety Management covers the project design phase and all stages of the Exploration and Production (E&P) value chain. This is to ensure that facilities are operated safely, well-maintained and regularly inspected. Recognizing this potential for harm, PTTEP has integrated the Process Safety Management into various work systems to prevent and handle any potential Major Accident Events.

(1) Process Safety Performance

To comply with the International Association of Oil and Gas Producers (IOGP) regulations and standards, PTTEP monitors and reports Tier 1 and Tier 2 events from production and drilling. In 2019, there were two reported Tier 1 events or 0.09 cases per million hours worked, which better than the 2018 performance of 0.11 cases per million hours worked.





In 2019, PTTEP organized training sessions on individual responsibility for process safety, “My Barrier” programs to manage process safety hazards and barriers. These programs include:

- Engineering and Construction project assurance program that ensures the identification and control of Major Accident Events (MAE) from a design perspective.
- Self-imposed Operational Safety Cases for each operating asset that demonstrates a satisfactory management of identified MAE's.
- Periodic MAE Prevention Tool monitoring that reported internal operating assets to highlight integrity risk.

7.3.4 Contractor Safety

PTTEP has continuously improved SSHE Contractor Management to ensure that everyone, including suppliers and contractors, can work and return home safely. Each year the company organizes the SSHE Contractor Forum. The forum brings together PTTEP and our suppliers and contractors to demonstrate PTTEP's strong commitment to improving Safety, Security, Health and Environment in our operations, and striving to become a Target Zero organization.

In 2019, the company's SSHE Day and SSHE Contractor Forum were held on the same day to foster relations and interaction between the company and suppliers/contractors. At the event, 60 representatives of PTTEP suppliers/contractors signed a covenant to promote a culture of SSHE and join PTTEP's journey towards becoming a Target Zero organization.

In addition, during the forum, suppliers/contractors were invited to share and exchange experiences in work-related accident prevention and compliance with safety regulations.

7.4 Emergency and Crisis Management

PTTEP is fully aware that maintaining high safety standards is critically important for our business. As such, PTTEP has developed Emergency and Crisis Management Plans under the framework of the SSHE MS. The plans clearly outline a systematic structure to ensure the company's readiness for emergency and crisis situations, giving priority to the protection of human lives, the environment, properties, and PTTEP reputation.



Joint exercises between the assets teams and corporate level based on the Emergency and Crisis Management Plans are conducted on a regular basis. Results and feedbacks from these exercises are communicated to those responsible at the assets and corporate levels. They are used to improve the plans as well as to enhance the competency of responsible personnel, to ensure that all forms of crisis situations can be effectively managed.

7.5 Occupational Health

The results of annual employee health checkups were compiled in an E-Health Book system. It serves as a health database which can be used for analyzing and evaluating the employees' health problems. In 2019, PTTEP reviewed the Health Risk Assessments (HRAs) for several assets, the results of which were used to further improve the current medical checkup programs.

The primary role of PTTEP medical and occupational health team is to provide medical and occupational health advice to all employees and contractors. The team is also responsible for developing and maintaining occupational health standards, procedures and approaches that promote a healthy and hygienic workplace, such as the Wellness Test and Ergonomic Consultation Campaign and annual medical and occupational health knowledge session for employees and contractors.

Program or Course	Number of Training Sessions
Medical and Occupational Health Management	5
Health and Hygiene Inspection for Food Handler	5
Health Risk Assessment	5

In addition, PTTEP provides guidance on health risk assessment to our contractors, to ensure that their occupational health risk assessment and that of PTTEP are of the same standard. In so doing, meaning the health of our employees and contractors will improve together. The results of the health risk assessment are communicated to relevant parties in order to formulate a risk mitigation plan that will lower the risk to an acceptable level. The health risk factors which were taken into account include hazards of physical, biological, chemical, ergonomic and psychological.

In 2019, PTTEP achieved the Total Recordable Occupational Illness Rate (TROIR) target of zero for a third consecutive year, with no employee fatality or cases with days away from work, job restriction, or transfer to another job.



8. Environmental Stewardship

PTTEP realizes that compliance with standards and regulations on community, social and environmental protection are essential to our business sustainability. Not only does it reduce direct and indirect environmental impacts, but also helps gain trust from our stakeholders. The company also promotes the responsible use of natural resources, environmental protection as well as sustainable conservation and management.

PTTEP strives to reduce our carbon footprint and ecological footprint. Therefore, PTTEP has adopted an internationally accepted environmental management system or ISO 14001 for all PTTEP operating areas in Thailand and overseas. All operating areas in Thailand and the Republic of the Union of Myanmar are certified with the latest version of ISO 14001 (ISO 14001 : 2015) from the AJA Registrars (currently SOCOTEC Certification (Thailand) Co., Ltd.) under the United Kingdom Accreditation Service (UKAS). PTTEP reports its environmental performance through the web-based Environmental Performance Reporting System (EPRS), to enhance the effectiveness of our environmental management and performance monitoring.

8.1 Environmental Targets

PTTEP has set the following targets in order to become a low carbon and ecological footprint organization:

- Reduce greenhouse gas emissions intensity by at least 25% by 2030, compared to the 2012 base year.
- Achieve zero oil and chemical spills.
- Avoid operating in areas prone to water scarcity and ensure that there is no impact on the community and water users.
- Achieve a No-net Loss of biodiversity in the protected areas as defined by the International Union for Conservation of Nature (IUCN) and no operations in World Heritage sites.

8.2 Reducing Our Carbon Footprint in response to Climate Change

One of PTTEP's key performance indicators on climate change is greenhouse gas emissions reduction. The company has set a target to reduce greenhouse gas emissions intensity by at least 25% by 2030, compared to the 2012 base year. This target aligns with Thailand's commitment on global climate change action made at the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change.

The company is committed to improving our production process, including by initiating projects to develop new technologies that can reduce greenhouse gas emissions in line with our established target. From 2013 to 2019, the company was able to reduce 1,667,000 tonnes of CO₂ equivalent from our activities.

In 2019, PTTEP reduced greenhouse gas emissions intensity by 14% when compared to the 2012 base year. In addition, 256,498 tonnes of CO₂ equivalent was reduced through the Greenhouse Gas Reduction programs as follows:

- **Flare gases recovery and utilization:** this approach reduced greenhouse gas emissions by 194,124 tonnes of CO₂ equivalent.

Highlight Project
<p>Change of membrane type has led to greater efficiency and CO₂ emissions reduction</p> <p>In 2019, PTTEP began using a new type of membrane in the gas separation process at the Arthit project and Greater Bongkot South in the Gulf of Thailand, to increase the efficiency of the process of separating CO₂ from natural gas. This resulted in a reduction of 12,578 tonnes of CO₂ equivalent released into the atmosphere.</p>

- **Energy efficiency:** for example, excess heat in the process of electricity generation is used to produce steam; minimizing the use of water pumps in the cooling system for greater efficiency; and implementing a system to control and monitor marine vessel transportation to reduce fuel consumption. These measures resulted in a reduction of greenhouse gas emissions by 62,374 tonnes of CO₂ equivalent.

- **Reducing methane leakage:** the company inspects onshore and offshore operations for methane leakage. The inspection focuses on methane gas detection and maintenance of those where the leak is found. The program resulted in a reduction of greenhouse gas emissions (Small Volume).

Reduction of greenhouse gas emissions (Tonnes of CO₂ equivalent)



PTTEP offsets the carbon footprint of our internal events and activities by purchasing carbon credits – either from governmental agencies or the communities – in order to support the Thailand Greenhouse Gas Management Organization (Public Organization) (TGO)’s carbon credit market. On March 1st, 2019, the company offsets the greenhouse gas emissions of the 2019 PTTEP SSHE Forum by purchasing carbon credits from CO₂ Recovery Plant for Sodium Bicarbonate Production by Genius Integrated Solutions Co., Ltd.

The company also participates in TGO’s Low Emission Support Scheme (LESS). In 2019, 116 tonnes of CO₂ equivalent was reduced by way of projects on alternative energy, energy efficiency and waste management.

Moreover, in 2019, PTTEP conducted a Phase 1 study on the effectiveness in capturing CO₂ of the PTTEP Reforestation project, which began in 2013 to mitigate the impact of climate change. Phase 1 study covered the forest area of 52,500 rai. It found that the carbon capture capacity of the studied forest area is 1.4 tonnes of CO₂ per rai per year, or 73,500 tonnes of CO₂ per year.



8.3 Managing Our Ecological Footprint

Managing PTTEP’s ecological footprint involves Spill Prevention, Waste Management, Water Resources Management, Air Pollution Reduction and Biodiversity Management.

8.3.1 Spill Prevention

PTTEP has a dedicated approach for spill prevention and commits to achieving the target of zero spills – an important target to reduce our ecological footprint. In 2019, PTTEP in cooperation with PTT Group, formulated the PTT Group Oil Spill Response Plan and Oil Spill Remediation Guideline. These documents were drafted in accordance with the National Oil Spill Contingency Plan and enable the company to be better equipped in mitigating the impact of spills on human lives, the environment, properties and the company’s reputation.

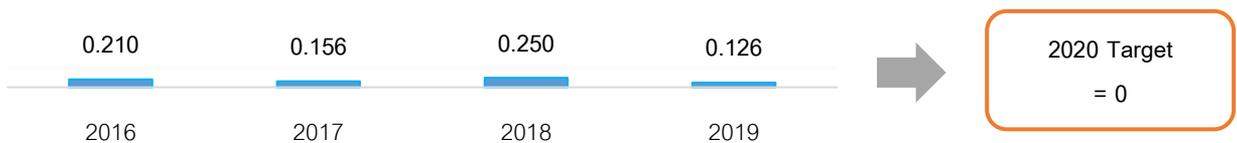
Oil and Chemical Spill Rate (Tonnes per million tonnes of petroleum production)



8.3.2 Waste Management

On waste management, PTTEP has applied the 3Rs (Reduce, Reuse, Recycle) to its operations, to achieve maximum efficiency in resource utilization in our operating areas. This has resulted in a steady reduction of waste to landfill. In 2019, there was no hazardous waste to landfill from the offshore petroleum production fields in the Gulf of Thailand. PTTEP’s target for 2020 is to achieve zero hazardous waste to landfill produced by all its operating units.

Percentage of Hazardous Waste to Landfill (%)



Highlight Project
<p>In-situ Pipeline Decontamination Project for Pipeline Decommissioning</p> <p>PTTEP has continuously developed technology for subsea pipeline decontamination and residual contaminant monitoring after the decontamination process. In 2019, PTTEP was successful in applying the developed chemicals for subsea pipeline decontamination. Moreover, PTTEP in cooperation with Chulalongkorn University and Srinakharinwirot University, developed a contaminant test kit which can be used for conducting a preliminary contamination analysis at offshore platforms. It also reduces the time and steps required in the decontamination process.</p>



8.3.3 Water Resources Management

Water is an essential resource for Exploration and Production (E&P) activities. PTTEP assesses water management-related risks in all of the operating areas, in order to prevent the problems of water quality and scarcity affecting the surrounding communities. In addition, the company has conducted studies on how to improve the efficiency of water use and water conservation, as well as formulated an action plan to control the use of water. Stakeholders in the operating areas were engaged for their views and suggestions. PTTEP water management plans have been communicated to our relevant suppliers and contractors. Moreover, the company closely monitors the amount of water withdrawal, water consumption and water discharge through the company's environmental performance reporting system. As none of the PTTEP's operating areas has a "High" water risk, the company focuses instead on balancing the company's water consumption with the needs of the surrounding communities and environment.

On water discharge management, the company treats produced water by reinjecting it back into the underground petroleum reservoirs. In 2019, 99.5% of the produced water was re-injected, while 0.5% of the produced water was treated and discharged in accordance with the relevant standards and regulations.

8.3.4 Air Pollution Reduction

PTTEP is committed to reducing air pollutant emissions, such as nitrogen oxides (NOx), sulfur oxides (SOx), volatile organic compounds (VOCs), etc. by continuously improving the efficiency of gas flaring and the machinery and equipment in the petroleum production process. In addition, the company strives for alternative uses of excess gas from the production process instead of it being flared.

8.3.5 Biodiversity Management

Impact on biodiversity is integral to PTTEP's business decision making process, in order to avoid and reduce the negative impact. The company has set a target to achieve a No-net Loss of biodiversity in protected areas as defined by the International Union for Conservation of Nature (IUCN) and no operations in World Heritage sites.

In 2019, PTTEP developed the Biodiversity Offset Strategy for the Zawtika Onshore Gas Transportation project in the Republic of the Union of Myanmar, which is located in a protected area as defined by IUCN, to evaluate existing project management and identify effective ways forward to achieve a No-net Loss. Moreover, the company conducted studies on marine species and sessile animals found near the petroleum production rigs. Data from the studies is used as the baseline information for biodiversity management of the offshore petroleum production projects in the Gulf of Thailand.



9. Value Creation for Communities and Society

PTTEP values social development as well as the conservation of natural resources and the environment. All our stakeholders, including government agencies, are regularly engaged and communicated with through meetings, activities and projects conducted across our operating areas. A long-term strategy for social projects is in place to build trust and acceptance from the communities including relevant stakeholders, in accordance with the Community Relations Management and Corporate Social Responsibility Policy. PTTEP strives to gain trust, acceptance and also supports undertakings that will bring benefits to the company and society as a whole.

PTTEP's social strategy is designed as a two-level strategy. The macro-level strategy focuses on restoring marine abundance by creating public sector's networks for the conservation and breeding of aquatic animals with economic value, and promoting activities that reduce marine debris. The micro-level strategy focuses on the promotion and development of social development projects in our operating areas. PTTEP operates our social development projects under 4 themes; Basic Need, Education, Environment, and Culture which are in line with the United Nations Sustainable Development Goals (UN SDGs).

9.1 Approach to Social Development Project Management

PTTEP's social development projects are based on the notions of community participation and long-term value creation for society while minimizing negative impacts on stakeholders in our operating areas. This approach complements and reflects PTTEP's vision of being an "Energy Partner of Choice".

PTTEP's Stakeholder Management System (ISMS) assesses which social impact and social issues may be a cause of concern for the community. Community relations officers are required to revise and update the ISMS Report annually. This information is used for selecting suitable and appropriate social development projects for each operating area.

In 2019, all of PTTEP's 143 social projects across our operating areas were implemented with 100% of community participation and the total contribution to social projects of 11.16 million USD. Additionally, 3,263 employees participated in volunteer programs with a combined employee volunteer time of 11,196 hours.

In dealing with complaints, PTTEP's Grievance Handling Guideline sets a standardized approach. This is a channel for stakeholders to voice their concerns, complaints, etc. In 2019, the company did not receive any serious conflict issues affecting any stakeholders.

9.2 Creating Value for Communities and Operating Countries

PTTEP is faced with a specific challenge in operating areas both in Thailand and overseas. In Thailand the company has implemented various projects to serve the stakeholders' needs and uplift their quality of life. For example, the Lan Krabue Hospital project helps to promote good health and well-being of communities, The Nurse Aide Training Program, run by Songkhla Hospital and Boromarajonani College of Nursing, Songkhla province, trains assistant nurses that can provide basic care for children and elderly people in the community. The program lessens the burden on government healthcare facilities. The Waste to Energy project produces cooking gas from household wastes. It promotes a proper waste management in communities

as well as reduces household expenses. As of 2019, the company has installed 241 biogas tanks for the communities in the Siphuhorm operating area in Udon Thani province and set up a biogas learning center in Tab Hai village to share knowledge with interested visitors. Given its success, the company has replicated this project in communities in the Zawtika operating area in the Republic of the Union of Myanmar.

Overseas, remote communities with limited access to public utilities, sanitation is a major concern for them. The company has implemented projects to improve public health and raise awareness about personal hygiene. In the Republic of the Union of Myanmar, in addition to the ongoing Parasite-Free School project in 35 schools, PTTEP, together with the Local Health Department, runs a Mobile Health Check Program for communities in remote areas. In 2019, the project provided medical treatment for 4,459 patients in Thayet and Pyaphone Townships. To create sustainable social value, the company concentrates on human capital development in the countries where we operate. In addition to the scholarship programs, the company works with the Skill Training Center, Ministry of Labor of the Republic of the Union of Myanmar on the Technical Capacity Building and Development project, to address the shortage of skilled labor. Training courses for welders, electricians and air-conditioning installers were organized. Up to now, this project has trained and supplied 1,285 technicians for Myanmar's business and industrial sectors, amounting to 192,000 of accumulated training hours. With the support of the company, 483 technicians under this project passed the skills evaluation of the National Skills Standards Authority (NSSA). Moreover, the company, together with PTT Group, provides a 4-year High Vocational Scholarship Program for Myanmar students to study in the field of machinery (English program) at IRPC Technological College in Rayong province, Thailand.

In the Republic of Indonesia, PTTEP works with Dompot Dhuafa to operate LKC Free Clinic that provides free medical services to poor communities in Cilincing, Koja and Tanjung Priok, north of Jakarta. Besides this, the company supports the SIOLA Integrated Holistic Early Childhood Development Center project which is catered for different stages of child development, including nutrition and health advice, child protection and family counseling. The company also focuses on personnel investment by implementing the Beastudi Etos Indonesia Scholarship program which awards scholarships to engineering and medicine students. At present, 14 out of 25 scholars have graduated.

9.3 Value Creation for Thailand

PTTEP has a long-term objective to restore resource abundance to the ocean. The Aquatic Animal Hatchery Learning Center plays a key role in this plan. The company intends to expand the work of the center to cover 17 coastal provinces along the Gulf of Thailand and supports the creation of networks for the conservation of coastal and marine resources, to promote community participation and raise community awareness. Additionally, PTTEP plans to promote seafood processing as a means to increase the value of local products and raise the income of communities in those 17 coastal provinces.

PTTEP's social development projects aim to address local needs and concerns in accordance with 4 main themes. Example included:



The School-Based Integrated Rural Development project (School-BIRD) aims to transform a school into a learning site and center for the community's economic and social development by integrating basic education with vocational skill training, focusing on agri-business development as well as creating income opportunities for students, schools and communities, which will lead to a better quality of life.

PTTEP, together with PTT Group, founded the Kamnoetvidya Science Academy School (KVIS) and Vidyasirimedhi Institute of Science and Technology (VISTEC), to improve the quality of education, enhance science and technology research, and raise the country's competitiveness. Moreover, PTTEP, together with PTT group, set up Sarn Palung Social Enterprise Company Limited to operate a social enterprise business model. In 2019, PTTEP co-invested in the project "Café Amazon for Chance" at the Sattahip Naval Base in Sattahip district, Chon Buri province. Profits from the project are used to support activities and work of the Sea Turtle Conservation Center in the area.

9.4 Benefits Evaluation

To ensure that PTTEP social projects truly deliver benefits to our stakeholders, the company evaluates their Social Return on Investment (SROI) annually. In 2019, 7 projects in the operating areas of the Petroleum Supply Base (Songkhla province), S1 project (Kamphaeng Phet, Sukhothai and Phitsanulok provinces) and Sinphuhorm project (Khon Kaen and Udon Thani provinces) were evaluated. The results show that 85% of the projects delivered SROI 2 times more than the project cost, a further 5 projects delivered SROI 4 times more than the project cost. This SROI evaluation confirms that our projects deliver real social value to the stakeholders in our operational areas.

Moving forward, improvement will be made to the projects which delivered SROI less than 2 times the project cost.

PTTEP conducted a survey on stakeholders' perception and commitment in the operating areas of the Petroleum Supply Base (Songkhla province), S1 project (Kamphaeng Phet, Sukhothai and Phitsanulok provinces) and PTTEP 1 Project (Suphan Buri and Nakhon Pathom provinces), to identify the current commitment level. The results showed that stakeholders' commitment level was at Understanding Level or above (from the total in 4 levels; 1. Awareness 2. Understanding 3. Engagement and 4. support).

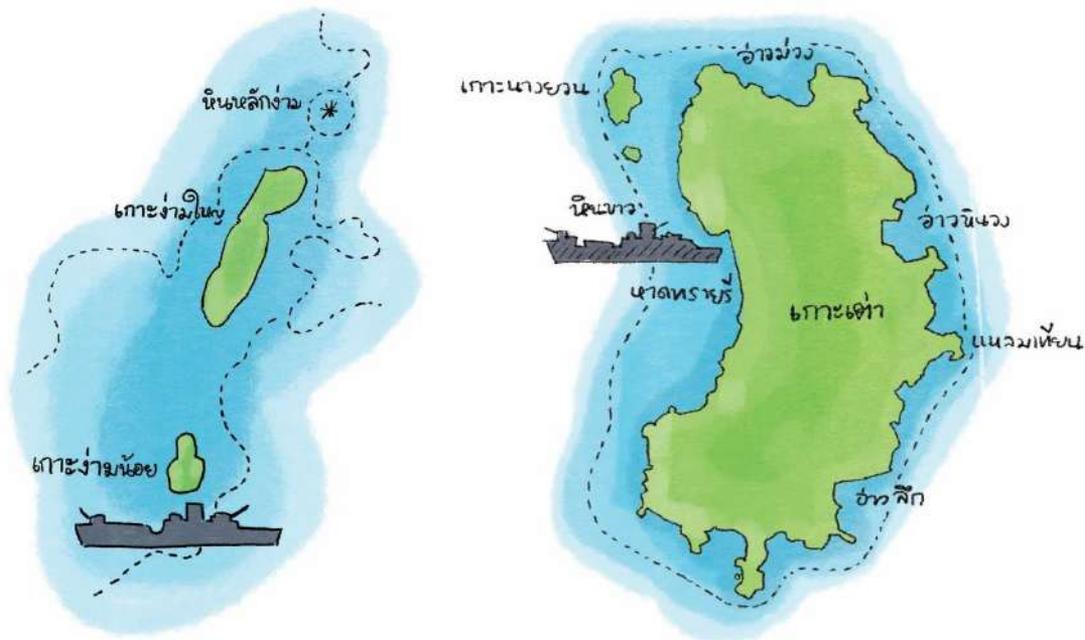
The SROI analysis and stakeholders' perception and commitment survey are of great value for the company. Based on the data, PTTEP social projects can be made to best serve the needs of our stakeholders. It remains a challenge for the company to raise the stakeholders' commitment level to Support Level.

9.5 Case Study

9.5.1 Case Study: H.T.M.S. Underwater Learning Site

Back in 2011, PTTEP, in collaboration with the Department of National Parks, Wildlife and Plants, the Department of Marine and Coastal Resources, local authorities, local communities and the Royal Thai Navy, initiated the H.T.M.S. Underwater Learning Site project as an alternative diving spot, to ease the pressure on natural coral reefs and allow them time to recover from coral bleaching. It also serves as a learning site for marine biodiversity.

Based on the study of currents, turbidity, seabed topography, types and number of marine species, as well as after having consulted with all relevant stakeholders, H.T.M.S. Prab was laid on the seabed near Koh Ngam Noi in Chumphon province and H.T.M.S. Sattakut near Koh Tao in Surat Thani province.



PTTEP sponsored the Department of Marine Science, Faculty of Fisheries, Kasetsart University, to study the change in marine ecosystem and biodiversity at these two sites over the periods prior to and after the ships were laid. The data collected will be used for the Rig-to-Reef project, which is part of the petroleum installation decommissioning activities.

These two former Royal Thai Navy ships have become popular diving spots that can generate income of over 59 million Baht for local communities and local businesses. To date, the project has generated approximately 472 million Baht.



Building on the success of the H.T.M.S. Underwater Learning Site project and in order to promote the conservation of natural resources and the environment, PTTEP launched an underwater photo contest H.T.M.S. Sattakut. In 2019, PTTEP produced a booklet and short TV documentary about this project, to raise awareness among tourists, divers and the general public about the importance and benefits of these two man-made diving sites.

SROI of this project is 1 : 5.34.



9.5.2 Case Study: Crab Hatchery Learning Center, Songkhla Province

PTTEP recognizes how important it is to restore marine resources and doing so also means higher income for local communities. In 2013, PTTEP worked with Hau Khao Community, National Institute of Coastal Aquaculture and Rajamangala University of Technology Srivijaya (Songkhla province), in setting up the Ban Hau Khao Crab Hatchery Learning Center in Singha Nakhon district, Songkhla province, to conduct research on crab hatchery.

Since then, the Crab Hatchery Learning Center has welcomed numerous interested visitors from all over the country and shared its knowledge on crab hatchery with them. Building on the success, PTTEP replicated the project in Pang Sai community in Sathing Pra district and Pa Na Rae community in Pattani province. The fourth learning center was completed the construction in Hau Sai district, Nakhon Si Thammarat province in December 2019. So far, the first three centers have received more than 10,000 visitors and released more than one billion juvenile crabs to the sea.

Moreover, PTTEP also supported the creation of networks for the conservation of marine and coastal resources. Currently, there are 33 such networks formed in Songkhla, Pattani and Nakhon Si Thammarat provinces, covering 25 conservation areas of over 18 square kilometers. The goal of these networks is the restoration of marine abundance and sustainable value creation for local communities.

SROI of this project is 1 : 2.29.

9.5.3 Case Study: Sea Turtle Conservation Project

The number of sea turtles in Thailand has steadily declined. If nothing is done to reverse the trend, they are likely heading towards extinction. The causes are both natural and man-made – marine debris, fisheries, hunting and changing marine environment itself. This alarming situation prompted PTTEP to realize that it is vitally important to conserve natural resources and the environment, focusing our effort on saving sea turtles from becoming extinct.

Since 2017, PTTEP has supported the Royal Thai Navy's Sea Turtle Conservation Center, Sattahip district, Chon Buri province. A memorandum of understanding was entered into between PTTEP and the Royal Thai Navy to enhance the center's capacity to nurse and treat sea turtles as well as promoting their conservation.

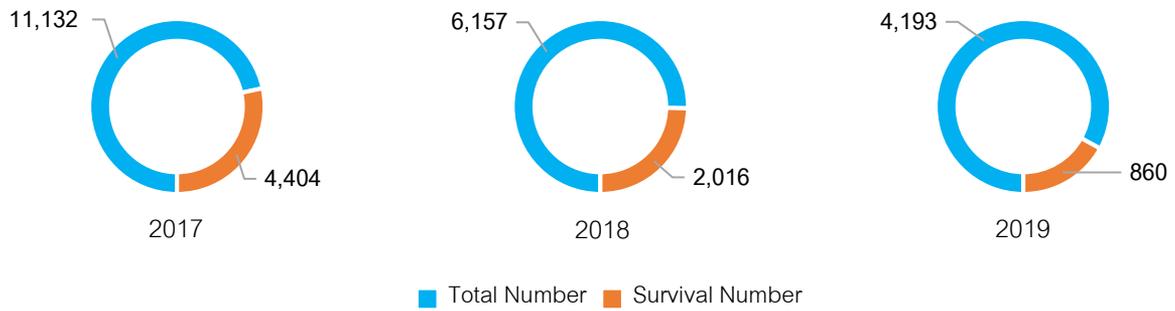
PTTEP helped renovate the building that houses the only sea turtle nursery and hospital in Asia. The facilities were modernized to meet the international health standard for nursing and treating sea turtles prior to their release back to their natural habitat. In addition, the company helped the center in acquiring medical equipment, organized an exhibition and prepared learning media on sea turtle conservation, and carried out landscape improvements at the center. The center is now an eco-tourism destination.

To further demonstrate PTTEP's continued commitment to conservation, a Sea Turtle Hospital will be opened in Songkhla province in 2020. The company, together with the Second Naval Area Command, also plans to set up a unit at the Songkhla Naval Base, to protect the Thai seas and endangered marine species.

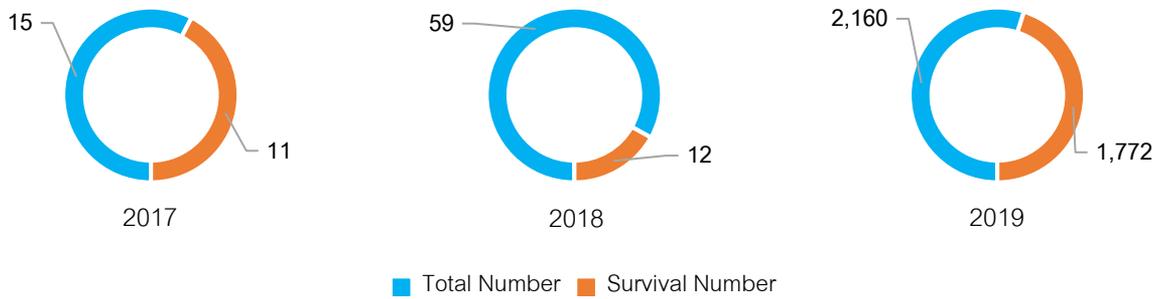
Moreover, PTTEP has encouraged our executives and employees to volunteer for sea turtle conservation activities, such as cleaning turtle ponds, scrubbing turtle shells and releasing baby sea turtles back to the sea.

SROI of this project is 1 : 4.37.

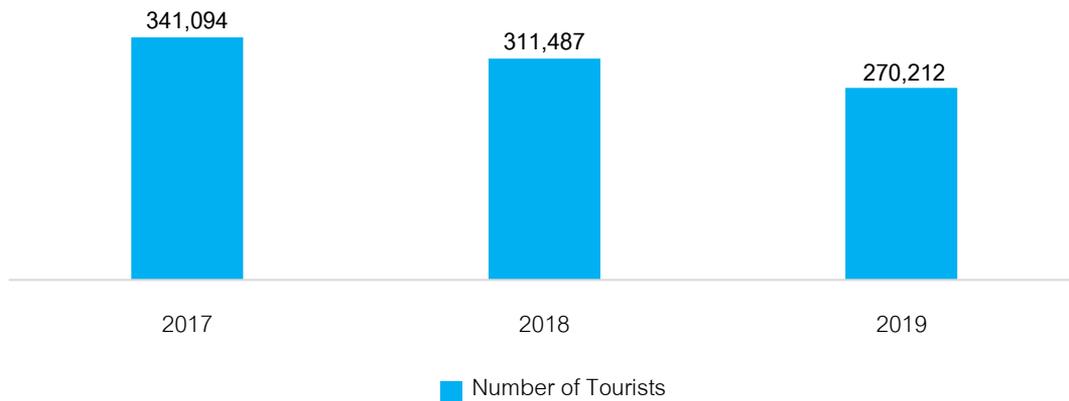
Number of Baby Sea Turtles Nursed and Treated



Number of Sea Turtles Treated at the Hospital for Injuries



Number of tourists at the Sea Turtle Conservation Center



10. Sustainable Development Performance Summary

Scope of Reporting	Thailand												Algeria		Australia	Canada	Malaysia	Myanmar					Vietnam		Brazil			
	G9/43	G1/61	G2/61	Arthit	B6/27	Bongkot	PTTEP 1	L53/43&L54/43	S1	L22/43	Sinphuhorm	Headquarter	Petroleum Development Support Base in Songkhla and Ranong	Algeria Hassi Bir Rekaiz	Algeria 433a & 416b ⁽²⁾	PTTEP Australasia	Mariana Oil Sands	Malaysia: Sarawak SK410B	Myanmar M11	Myanmar M3	Myanmar MD-7	Myanmar MOGE 3	Zawtika	Vietnam 16-1 ⁽²⁾	Vietnam 9-2 ⁽²⁾	Potiguar		
Environment⁽¹⁾																												
Hydrocarbon production	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Energy consumption	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Greenhouse gas emissions	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Flare	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Emissions (NOx, SOx, VOC)	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Spills	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Water withdrawal	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Water discharge	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Waste generation	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Waste disposal	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Biodiversity and ecosystem services	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Environmental compliance	NR	NR	NR	x	x	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	NR	NR	NR	x	NR	NR	NR	NR	NR	NR
Health and Safety																												
Fatality - Workforce	NR	NR	NR	x	NR	x	x	x	x	NR	x	x	x	x	NR	NR	x	x	NR	NR	NR	x	x	NR	NR	NR	NR	NR
Fatality - Contractors	NR	NR	NR	x	NR	x	x	x	x	NR	x	x	x	x	NR	NR	x	x	NR	NR	NR	x	x	NR	NR	NR	NR	NR
Occupational health and safety - Workforce	NR	NR	NR	x	NR	x	x	x	x	NR	x	x	x	x	NR	NR	x	x	NR	NR	NR	x	x	NR	NR	NR	NR	NR
Occupational health and safety - Contractors	NR	NR	NR	x	NR	x	x	x	x	NR	x	x	x	x	NR	NR	x	x	NR	NR	NR	x	x	NR	NR	NR	NR	NR
Process safety	NR	NR	NR	x	NR	x	x	x	x	NR	x	NR	x	x	NR	NR	x	x	NR	NR	NR	x	x	NR	NR	NR	NR	NR
Loss of primary containment	NR	NR	NR	x	NR	x	x	x	x	NR	x	NR	x	x	NR	NR	x	x	NR	NR	NR	x	x	NR	NR	NR	NR	NR
Corporate Social Responsibility																												
Volunteer	NR	NR	NR	x	x	x	x	x	x	x	x	x	x	NR	NR	NR	NR	NR	x	x	x	x	x	NR	NR	NR	NR	NR
In-kind giving	NR	NR	NR	x	NR	x	x	x	x	x	x	NR	x	NR	NR	NR	NR	NR	x	x	x	x	x	NR	NR	NR	NR	NR
Management overhead	x	x	x	x	x	x	x	x	x	x	x	x	x	NR	NR	NR	NR	NR	x	x	x	x	x	NR	NR	NR	NR	NR

Remarks:

⁽¹⁾ Scope of reporting for environmental data covers only projects that are in production phase and support

⁽²⁾ Joint operator

NR: Not relevant and excluded from scope of reporting

ECONOMICS⁽¹⁾

GRI Standards	Required Data	Unit	Data Collection Period			
			2016	2017	2018	2019
GRI:201 Direct Economic Value Generated						
201-1	Total revenue	Million USD	4,339	4,523	5,459	6,413
GRI:201 Economic Value Distributed						
201-1	Salary, wages and employees' benefits	Million USD	138.61	178.62	195.32	281.55
201-1	Operating expense	Million USD	582	652	645	751
GRI:201 Payment to Provider of Capital						
201-1	Payment to government ⁽²⁾	Million USD	950	826	1,331	1,636
201-1	Dividend payment	Million USD	310	459	556	698
201-1	Interest payment	Million USD	200	186	186	164
OGSD Proved Reserves and Production						
OG1	Total Proved Reserves	Million BOE	694.74	630.87	677.03	1,140.21
	Liquids (crude oil and natural gas liquids)	Million BOE	170.40	155.71	163.27	309.59
	Gas	Million BOE	524.34	475.15	513.76	830.62
	Total Hydrocarbon Production	Million BOE	-134.80	-126.84	-131.18	-150.98
	Liquids (crude oil and natural gas liquids)	Million BOE	-37.77	-34.76	-33.95	-40.69
	Gas	Million BOE	-97.03	-92.08	-97.23	-110.29

Remarks:

⁽¹⁾ Scope of reporting Economics performance is in alignment with PTTEP Annual Report 2019.

⁽²⁾ Payment to government covers petroleum royalties and tax payment.

CORPORATE SOCIAL RESPONSIBILITY

GRI Standards	Required Data	Unit	Data Collection Period			
			2016	2017	2018	2019
GRI:201 Total Contribution						
201-1	Total contribution	Million USD	11.23	11.59	12.62	11.16
-	Volunteer	Hours	4,806	18,807	9,280	11,196
-	In-kind giving	Million USD	1.00	0.99	1.03	1.18
-	Management overhead	Million USD	1.13 ⁽¹⁾	3.40	3.35	3.09

Remarks:

⁽¹⁾ Rectify cost of Management overhead due to typo (from 12.36 Million USD to 1.13 Million USD).



ENVIRONMENT⁽¹⁾

GRI Standards	Required Data	Unit	Data Collection Period							
			2016 ⁽²⁾		2017 ⁽³⁾		2018		2019	
			Thailand	International	Thailand	International	Thailand	International	Thailand	International
-	Hydrocarbon Production									
-	Production from operating asset	BOE	102,888,543	25,116,412	98,043,001	22,343,237	91,292,879	22,492,872	102,239,625	19,949,083
		Tonnes	15,112,236	3,339,866	14,936,612	2,855,571	14,040,323	2,574,323	14,874,273	2,223,853
GRI:302	Energy Consumption									
302-1	Total direct energy consumption	GJ	20,909,807	5,301,953	20,096,714	4,555,825	19,585,720	4,757,786	22,006,804	3,737,819
302-1	Total indirect energy consumption by primary energy source (electricity purchased) ⁽⁴⁾	GJ	106,908	6,828	141,785 ⁽⁴⁾	2,578 ⁽⁴⁾	149,390	1,955	153,314	1,860
302-3	Total energy intensity	GJ/tonne production	1.39	1.59	1.35	1.60	1.41	1.85	1.49	1.68
GRI:305	Greenhouse Gas Emissions (GHGs) ^{(5) (6) (7)}									
305-1	Direct total GHGs	Tonne CO ₂ equivalent	4,048,528	582,963	4,083,327	561,541	3,660,334	467,283	3,662,275	251,958
305-2	Indirect total GHGs	Tonne CO ₂ equivalent	5,283	383	5,239	532	5,406	229	5,601	68
305-3	Other relevant indirect GHG emissions ⁽⁸⁾	Tonne CO ₂ equivalent	17,181	41,649	16,534	20,658	19,421	13,434	20,463	0
305-4 G4-EN18	GHG intensity	Tonne CO ₂ equivalent/ thousand tonnes production	269	187	275	204	262.47	186.82	247.97	113.33
OGSD	Flare									
OG6	Total flaring	MMscf	40,152	3,283	42,854	2,911	36,458	2,106	35,725	96
OG6	Hydrocarbon flaring	Tonne	982,161	77,194	1,043,084	68,809	886,178	49,613	894,610	1,910
OG6	Hydrocarbon flaring intensity	Tonnes/ thousand BOE	9.55	3.07	10.64	3.08	9.71	2.21	8.75	0.10
GRI:305	Emissions									
305-7	Volatile organic compounds (VOCs)	Tonne VOC	14,865	1,198	15,755	1,049	13,385	776	13,508	42
-	VOC intensity	Tonnes VOC/ thousand tonne production	0.984	0.359	1.055	0.367	0.953	0.302	0.908	0.019
305-7	Nitrogen oxides (NOx)	Tonnes NO ₂	8,746	2,115	7,868	1,253	7,122	1,655	6,926	832
-	NOx intensity	Tonnes NO ₂ / thousand tonnes production	0.579	0.633	0.527	0.439	0.507	0.643	0.466	0.374
305-7	Sulfur oxides (SOx)	Tonnes SO ₂	460	150	374	44	298	118	286	43
-	SOx intensity	Tonnes SO ₂ / thousand tonnes production	0.030	0.045	0.025	0.015	0.021	0.046	0.019	0.019
305-6	Ozone-depleting substances (hydrochlorofluorocarbon: HCFC) ⁽⁹⁾	Kg of CFC11 equivalent	3.7	NA	12.9	NA	6.8	16.8	33.4	19.1

GRI Standards	Required Data	Unit	Data Collection Period							
			2016 ⁽²⁾		2017 ⁽³⁾		2018		2019	
			Thailand	International	Thailand	International	Thailand	International	Thailand	International
GRI:306 Spills⁽¹⁰⁾										
306-3	Spills	Cases	9	7	9	4	8	1	10	0
		Tonnes	0.51	0.23	4.29	0.36	9.70	0.29	10.854	0
306-3	Hydrocarbons	Cases	9	7	8	3	8	1	9	0
		Tonnes	0.51	0.23	4.29	0.36	9.77	0.29	10.853	0
306-3	Non-hydrocarbons	Cases	0	0	1	1	0	0	1	0
		Tonnes	0.00	0.00	0.00	0.00	0.00	0.00	0.001	0
GRI: 303 (2018) Water Withdrawal										
303-3	Total water withdrawal from all areas ⁽¹¹⁾	Cubic meters	50,420,020	362,098	47,921,070	350,924	49,675,463	52,062	46,677,376	118,050
	Freshwater ⁽¹²⁾	Cubic meters	NA ⁽¹³⁾	NA	NA	NA	523,421	33,745	586,352	29,759
	Freshwater from areas with water stressed ^{(14) (15)}	Cubic meters	NA	NA	NA	NA	441,936	0	517,097	0
	Surface water	Cubic meters	NA	NA	NA	NA	0	0	0	0
	Groundwater	Cubic meters	NA	NA	NA	NA	425,022	0	498,552	751
	Municipal water supply	Cubic meters	NA	NA	NA	NA	16,914	0	18,545	0
	Water withdrawal excluding once through cooling water	Cubic meters	1,944,573	362,098	2,492,540	350,924	2,550,562	52,062	2,875,675	118,050
GRI: 303 (2018), OGSD Water Discharge^{(16) (17)}										
303-4 OG5	Total water discharge to all areas	Cubic meters	7,281,782	939,108	7,813,693	1,057,173	7,927,061	500,526	8,232,243	33,744
	Produced water	Cubic meters	7,281,782	939,108	7,760,171	1,057,173	7,892,085	500,526	8,094,276	33,744
	Injection	Cubic meters	7,276,263	0	7,755,653	0	7,885,638	0	8,085,622	0
	Disposed by evaporation	Cubic meters	4,823	103,679	2,601	0	2,915	0	493,608	0
	Treated & discharged	Cubic meters	0	835,429	0	1,057,173	0	500,526	0	33,744
	Disposed by waste processor	Cubic meters	696	0	1,917	0	3,532	0	4,673	0
	Process wastewater	Cubic meters	NA	NA	53,522	0	34,976	0	137,967	0
	Injection	Cubic meters	NA	NA	53,522	0	34,944	0	137,967	0
	Disposed by waste processor	Cubic meters	NA	NA	0	0	32	0	0	0
	Treated & discharged	Cubic meters	NA	NA	0	0	0	0	0	0
GRI: 306 Waste Generation^{(18) (19)}										
306-2	Hazardous waste	Tonnes	28,243	499	38,477	451	57,558	267	83,354	186
306-2	Non-hazardous waste	Tonnes	149,018	220	104,251	3,361	80,680	42,275	65,177	10,420
GRI:306, OGSD Waste Disposal^{(19) (20)}										
-	Hazardous waste	Tonnes	27,668	541	39,517	555	58,971	261	83,194	184
OG7	Drilling mud and cutting waste	Tonnes	25,348	0	36,571	0	54,811	0	58,219	0
306-2	Other hazardous waste	Tonnes	2,320	541	2,946	555	4,159	261	24,975	184
-	Non-hazardous waste	Tonnes	148,953	199	104,253	3,361	80,599	42,275	65,201	10,419
OG7	Drilling mud and cutting waste	Tonnes	143,139	0	100,871	2,809	78,859	41,859	59,266	10,029
306-2	Other non-hazardous waste	Tonnes	5,814	199	3,382	552	1,741	416	5,935	390

GRI Standards	Required Data	Unit	Data Collection Period							
			2016 ⁽²⁾		2017 ⁽³⁾		2018		2019	
			Thailand	International	Thailand	International	Thailand	International	Thailand	International
306-4	Exported hazardous waste under the Basel Convention	Tonnes	0	0	1,169	0	1,055	0	871	0
GRI:304, OGSD Biodiversity and Ecosystem Services										
OG4	Significant operating sites where biodiversity risks has been assessed	Number of sites	8	3	8	2	8	2	8	1
		%	100	100	100	100	100	100	100	100
304-1	Significant operating sites exposed to significant biodiversity risks	Number of sites	0	0	0	0	0	0	0	0
		%	0	0	0	0	0	0	0	0
- Environmental Management ⁽²¹⁾ (22)										
-	Investing in managing environmental impacts	Million USD	39.56	0.98	38.016	1.36	21.30 ⁽¹⁶⁾	1.89	7.36	0.88
-	Treatment and disposal expenses	Million USD	4.85	0.69	10.22	0.28	4.76 ⁽¹⁶⁾	0.10	2.05	0.08
-	Protection, management and investments	Million USD	34.71	0.29	27.80	1.08	16.55 ⁽¹⁶⁾	1.80	5.32	0.80
-	Percentage of prevention cost in total environment expense	%	88	30	73	79	78	95	72	90
GRI: 307 Legal Compliance										
307-1	Significant fines, penalties and settlements	Cases	0	0	0	0	0	0	0	0
		Million USD	0	0	0	0	0	0	0	0

Remarks:

- ⁽¹⁾ PTTEP revised the category for environmental data to Thailand and international from 2016 onwards.
- ⁽²⁾ International column includes Australia, Myanmar and Oman assets in 2016.
- ⁽³⁾ Since 2017, international column includes Australia and Myanmar assets as PTTEP completed sales agreement of Oman asset.
- ⁽⁴⁾ Revised 2017 data due to consistency of calculation methodology.
- ⁽⁵⁾ Total direct GHG emissions (Scope 1) based on equity basis is not included in this report.
- ⁽⁶⁾ GHG emissions from well service venting is not included.
- ⁽⁷⁾ In 2018, methane (CH4) emission is equivalent to 9,710 and 3,126 tonnes CH4 for Thailand and International assets respectively.
- ⁽⁸⁾ Other relevant indirect GHG emissions (Scope 3) is comprised of transportation and air travel.
- ⁽⁹⁾ Ozone-depleting substances (ODS) includes Hydrochlorofluorocarbon (HCFC) only.
- ⁽¹⁰⁾ 2015 reported spills includes production phase of operating assets in Thailand and International assets.
- ⁽¹¹⁾ Total water withdrawal from all areas excluded produced water.
- ⁽¹²⁾ Refer to PTT Group Procedure, total dissolved solid < 2,000 mg/L.
- ⁽¹³⁾ NA (not available)
- ⁽¹⁴⁾ Water stress area classified by IPIECA Global Water Tool.
- ⁽¹⁵⁾ Since 2018, water risk assessment for water stress area has been conducted to covers the operation in Myanmar asset.
- ⁽¹⁶⁾ In 2018, hydrocarbon discharged within produced water is equal to 0 and 11.93 tonnes for Thailand and International assets respectively.
- ⁽¹⁷⁾ Since 2017, injected process wastewater was reported to include in water discharge.
- ⁽¹⁸⁾ In 2018, hazardous and non-hazardous waste disposal subtracted by reuse/recycling/recovery are 4,204 and 122,394 tonnes.
- ⁽¹⁹⁾ Waste generation and disposal included both production and drilling activities.
- ⁽²⁰⁾ The difference between waste generation and disposal amount is accounted for on-site storage.
- ⁽²¹⁾ Refer to 2017 environmental management expenses for S1.
- ⁽²²⁾ In 2019, environmental expenditure is based on new systematic environmental management accounting methodology as PTT Group Guideline, which is has been implemented in Q3, 2019.

HEALTH AND SAFETY⁽¹⁾

GRI Standards	Required Data	Unit	Data Collection Period									
			2016		2017		2018			2019		
			Thailand	International	Thailand	International	Thailand	International	PTTEP Global	Thailand	International	PTTEP Global
GRI:403 (2018) Occupational health and Safety (OHS) Management System												
403-8	Workforce and contractor covered by SSHE Management System ⁽²⁾⁽³⁾⁽⁴⁾	Persons	7,052	1,441	7,205	1,378	7,102	1,048	8,150	6,775	1,360	8,135
		%	100	100	100	100	100	100	100	100	100	100
GRI:403 (2018) Fatalities												
403-9	Total number	Cases	0	0	0	0	1	0	1	0	0	0
	Workforce ⁽³⁾	Cases	0	0	0	0	0	0	0	0	0	0
	Contractors ⁽⁴⁾	Cases	0	0	0	0	1	0	1	0	0	0
403-9	Fatal accident rate (FAR) - Workforce	Cases per million hours worked	0	0	0	0	0	0	0	0	0	0
403-9	Fatal accident rate (FAR) - Contractors	Cases per million hours worked	0	0	0	0	0.06	0	0.05	0	0	0
GRI:403 (2018) Occupational Health and Safety												
403-9	Total recordable incident rate (TRIR) - Workforce	Cases	1	4	5	1	2	3	5	6	0	6
		Cases per million hours worked	0.13	2.76	0.69	0.77	0.28	2.17	0.59	0.81	0	0.64
403-9	Total recordable incident rate (TRIR) - Contractors	Cases	16	5	4	12	12	4	16	9	1	10
		Cases per million hours worked	1.00	1.04	0.24	2.54	0.74	1.22	0.82	0.61	0.22	0.51
403-9	Lost time injury frequency (LTIF) - Workforce	Cases	0	0	1	0	0	0	0	0	0	0
		Cases per million hours worked	0	0	0.14	0	0	0	0	0	0	0
403-9	Lost time injury frequency (LTIF) - Contractors	Cases	2	1	0	2	2	0	2	2	0	2
		Cases per million hours worked	0.13	0.21	0	0.42	0.12	0	0.10	0.14	0	0.10
-	Severity of lost work day cases - Workforce	Average days lost per LWDC	0	0	25.02	0	0	0	0	0	0	0
-	Severity of lost work day cases - Contractor	Average days lost per LWDC	0.84	0.21	0	25.71	3.68	0	3.07	14	0	14
-	Severity of restricted work day cases - Workforce	Average days lost per RWDC	0.43	33.36	1.81	7.39	1.13	59.34	10.62	6.67	0	6.67
-	Severity of restricted work day cases - Contractor	Average days lost per RWDC	5.49	0	2.81	18.21	2.39	24.43	6.08	5.50	7	6
403-9	Near Miss - Workforce	Cases	21	28	9	14	10	17	27	16	6	22
403-9	Near Miss - Contractors	Cases	14	7	16	15	22	15	37	39	13	52



GRI Standards	Required Data	Unit	Data Collection Period									
			2016		2017		2018			2019		
			Thailand	International	Thailand	International	Thailand	International	PTTEP Global	Thailand	International	PTTEP Global
GRI:403 (2018) Illness												
403-10	Total recordable occupational illness frequency (TROIF) - Workforce ⁽⁵⁾	Cases per million hours worked	0	2.53	0	0	0	0	0	0.13	0	0.11
403-10	Total recordable occupational illness frequency (TROIF) - Contractors ⁽⁵⁾	Cases per million hours worked	0	0	0	0	0	0	0	0.07	0	0.05
OGSD Process Safety												
OG13	Number of Tier 1 process safety events	Cases	0	0	1	0	1	0	1	1	1	2
OG13	Number of Tier 2 process safety events	Cases	1	0	0	0	1	0	1	0	0	0
OGSD Loss of Primary Containment (LOPC)												
OG13	Loss of primary containment (LOPC)	Number of incidents per million work hours of drilling and production	0.06	0	0.06	0	0.12	0	0.11	0.06	0.25	0.09

Remarks:

- ⁽¹⁾ International column includes Malaysia, Myanmar, Canada, Indonesia (Malunda project), and Algeria.
- ⁽²⁾ SSHE management system includes Head office, Greater Bongkot North (GBN), Greater Bongkot South (GBS), Arthit (ART), S1, Suphanburi, Sinphuhom, Petroleum Development Support Base in Songkhla and Ranong (PSB and RSB), Malaysia, Myanmar, Canada, Indonesia (Malunda project), and Algeria.
- ⁽³⁾ Workforce means employees and supervised workers of PTTEP (PTTEP Services Limited).
- ⁽⁴⁾ Contractor means an individual or a company carrying out work under the supervision, instructions and SSHE Management System of PTTEP or subsidiaries within the reporting boundary.
- ⁽⁵⁾ Total recordable occupational illness frequency (TROIF) includes work-related ill health that results in fatality (FAT), days away from work (LTI), restricted work or transfer to another job (RWDC), and medical treatment (MTC).



LABOR PRACTICES

GRI Standards	Required Data	Unit	Data Collection Period							
			2016		2017		2018		2019	
			Male	Female	Male	Female	Male	Female	Male	Female
GRI:102, 405 Workforce										
102-8	Total Workforce ⁽¹⁾	Persons	3,794		3,774		3,861		4,449	
		Persons	2,540	1,254	2,509	1,265	2,582	1,279	2,980	1,469
Staff by region										
102-8	Thailand	Persons	2,043	1,071	1,991 ⁽²⁾	1,070 ⁽²⁾	1,986	1,062	2,035	1,109
	Australia	Persons	107	30	100 ⁽²⁾	30 ⁽²⁾	114	23	2	1
	Myanmar	Persons	272	102	310 ⁽²⁾	118 ⁽²⁾	371	138	346	132
	Others	Persons	118	51	108 ⁽²⁾	47 ⁽²⁾	111	56	597	227
Staff by age										
405-1	<30 years	Persons	408	222	361	187	343	182	327	173
	30 - 50 years	Persons	1,760	941	1,793	976	1,842	986	2,189	1,148
	>50 years	Persons	372	91	355	102	397	111	464	148
Staff by employment type										
102-8	Permanent ⁽³⁾	Persons	1,541	975	1,484	794	1,562	799	1,770	932
	Temporary ⁽⁴⁾	Persons	999	459	1,025	471	1,020	480	1,210	537
Staff by employee category										
405-1	Executives	Persons	26	8	30	12	28	11	32	10
	Middle Management	Persons	83	23	89	22	86	22	98	30
	Senior	Persons	912	276	835	292	814	230	1,224	360
	Employee	Persons	1,519	947	1,555	939	1,654	1,016	1,626	1,069
GRI:404 Training and Development										
404-1	Average all employees	Hours /person /year	32	20	55	39	60	44	46	36
Employee Satisfaction										
-	Employee satisfaction ⁽⁵⁾	%	53		65		66		-	
GRI:405 Composition of Governance Bodies										
405-1	Board of directors	Persons	14	1	14	1	12	2	13	2
	Executives	Persons	26	8	30	12	28	11	32	10
	Middle management	Persons	83	23	89	22	86	22	98	30
	Senior	Persons	912	276	835	292	814	230	925	248
	Employee	Persons	1,519	947	1,555	939	1,654	1,016	1,925	1,181
GRI:401 New Employee Hire by Age Group										
401-1	<30 years	Persons	27	23	48	43	81	48	75	36
	30 - 50 years	Persons	41	15	51	35	58	33	94	51
	>50 years	Persons	11	1	14	4	24	3	13	1
	Total	Persons	79	39	113	82	163	84	182	88
401-1	New hire rate	% of total employees	2.1	1.0	3.0	2.2	4.2	2.2	4.1	2.0
GRI:401 Turnover by Age Group										
401-1	< 30 years	Persons	29	29	18	28	12	15	16	17
	30 - 50 years	Persons	98	94	81	42	50	46	50	23
	> 50 years	Persons	31	9	56	7	52	12	19	3
	Total	Persons	158	132	155	77	114	73	85	43
401-1	Turnover rate	% of total employees	4.2	3.5	4.1	2.0	3.0	1.9	1.9	1.0
GRI:401 Turnover by Type										
401-1	Voluntary resignation	Persons	111	124	128	72	61	57	67	43
	Dismissal	Persons	30	5	8	2	29	8	9	0
	Retirement	Persons	16	3	17	2	20	8	5	0
	Death - not related to work	Persons	1	0	2	1	4	0	4	0

GRI Standards	Required Data	Unit	Data Collection Period							
			2016		2017		2018		2019	
			Male	Female	Male	Female	Male	Female	Male	Female
GRI:401 Parental Leave										
401-3	Number of Employees taken parental leave	Persons	35	39	37	45	34	44	94	56
	Total Number of employees that were entitled to parental leave	Persons	2,540	1,254	2,509	1,265	2,582	1,279	2,980	1,469
	Employee returned to work after parental leave	Persons	100	97.4	97.3	100	100	97.4	100	100
GRI:412 Integrity										
412-2	Training hours concerning human rights, anti-bribery, and corruption	Hours	502	339	1,199	846	1,223	1,702	688.5	660.5
GRI:405 Gender Diversity and Equal Remuneratio										
405-2	Ratio basic salary women/men	Ratio	0.73		0.78		0.78		0.83	
	Thailand (Or other significant localtion of operations)	Ratio	0.93		0.93		0.93		0.93	
	Myanmar (Or other significant localtion of operations)	Ratio	1.02		1.16		1.25		1.3	
GRI:405 Gender Diversity and Equal Remuneration										
405-1	Women in workforce	Persons	1,254		1,265		1,279		1,469	
		%	33		34		33		33	
405-1	Women in professional positions	Persons	947		939		1,016		1,069	
		%	38		38		38		40	
405-1	Women in management positions	Persons	276		292		230		360	
		%	23		26		22		23	
405-1	Women in senior leadership positions	Persons	31		34		33		40	
		%	22		26		22		24	

Remarks:

- (1) Total workforce is the total number of employees involved in core activities of PTTEP's and subsidiaries'. This does not include workers and supervised workers performing non-core activities in the company e.g. maids, gardeners and drivers, etc.
- (2) Restatement is made to 2017 number of staff by region due to edition of calculation methodology from grouping by work unit to grouping by work location.
- (3) Permanent means employment contracts with indeterminate period made with PTTEP or its subsidiaries excluding PTTEP Services which is manpower agency of PTTEP.
- (4) Temporary means employment contracts with or without specific employment period made through manpower agencies e.g. PTTEP Services, etc.
- (5) Employee Engagement was not conducted in 2019.



11. Statement of External Assurance



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Independent limited assurance report

To the Directors of PTT Exploration and Production Public Company Limited (“PTTEP”)

Conclusion

Based on the procedures performed, as described below, nothing has come to our attention that causes us to believe that the selected subject matters (“Subject Matters”) identified below and included in the Sustainability Report 2019 (the “Report”) for the year ended 31 December 2019 and disclosures regarding their adherence to the three AccountAbility Principles of Inclusiveness, Materiality and Responsiveness under AA1000APS (2008), and reliability of Subject Matters, are not, in all material respects, prepared in compliance with the reporting criteria (the “Criteria”).

Our Responsibilities

We have been engaged by PTTEP and are responsible for providing a limited assurance conclusion in respect of the Subject Matters for the year ended 31 December 2019 to be included in the Report as identified below.

Our assurance engagement is conducted in accordance with the International Standard on Assurance Engagements ISAE 3000 *Assurance Engagements other than Audits or Reviews of Historical Financial Information* and ISAE 3410 *Assurance on Greenhouse Gas Statements*. We have also conducted our engagement in accordance with the Accountability Assurance Standard of Sustainability AA1000AS (2008) at moderate level that corresponds to a limited assurance as per ISAE 3000 with a Type 2 engagement, which covers not only the nature and extent of the organisation’s adherence to the AA1000APS (2008), but also evaluates the reliability of Subject Matters as indicated below. These standards require the assurance team to possess the specific knowledge, skills and professional competencies needed to provide assurance on sustainability information, and that we plan and perform the engagement to obtain limited assurance on whether the Subject Matters are prepared, in all material respects, in compliance with the Criteria. We have complied with the requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants to ensure their independence. The firm applies International Standard on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

We have not been engaged to provide an assurance conclusion on any other information disclosed within the Report.

Subject Matters

Subject Matters comprised of the following data expressed numerically or in descriptive text for the year ended 31 December 2019:

- GRI 302-1 Energy consumption within organization (2016 version)
- GRI 303-3 Water withdrawal (2018 version)
- GRI 303-4 Water discharge (2018 version)
- GRI 305-1 Direct (Scope 1) GHG emissions (2016 version)
- GRI 305-2 Energy indirect (Scope 2) GHG emissions (2016 version)
- GRI 305-3 Other indirect (Scope 3) GHG emissions (2016 version)
- GRI 305-6 Emissions of ozone-depleting substances (ODS) (2016 version)
- GRI 305-7 Nitrogen oxides (NOx), Sulfur oxides (SOx), and other significant air emissions (2016 version)
- GRI 306-2 Waste by type and disposal method (2016 version)
- GRI 306-3 Significant spills (2016 version)
- GRI 403-9 Work-related injuries (2018 version)
- GRI 403-10 Work-related ill health (2018 version)
- OGSD – OG4 Number and percentage of significant operating sites in which biodiversity risk has been assessed and monitored
- OGSD – OG5 Volume and disposal of formation or produced water



- OGSD – OG7 Amount of drilling waste (drill mud and cuttings) and Strategies for treatment and disposal

Criteria

The Subject Matters were assessed according to the following criteria:

- The Sustainability Reporting Standards of the Global Reporting Initiative (“GRI Standards”);
- The Oil and Gas Sector Disclosures (“OGSD”); and
- AA1000 AccountAbility Principles Standard (2008) (“AA1000APS (2008)”).

Directors’ and management’s responsibilities

The directors and management of PTTEP are responsible for the preparation and presentation of the Subject Matters, specifically ensuring that in all material respects the Subject Matters are prepared and presented in accordance with the Criteria. This responsibility also includes the internal controls relevant to the preparation of the Report that is free from material misstatement whether due to fraud or error.

Procedure performed

In forming our limited assurance conclusion over the Subject Matters, our procedures consisted of making enquiries and applying analytical and other evidence gathering procedures including:

- Interviews with senior management and relevant staff at corporate and operating sites;
- Inquiries about the design and implementation of the systems and methods used to collect and process the information reported, including the aggregation of source data into the Subject Matters;
- Inquiries about managements practices and procedures related to identifying stakeholders and their expectations, determining material sustainability matters and implementing sustainability policies and guidelines;
- Visits to 2 sites; Arthit project and PTTEP 1 project, selected on the basis of risk analysis including the consideration of both quantitative and qualitative criteria;
- Agreeing the Subject Matters to relevant underlying sources on a sample basis to determine whether all the relevant information has been included in the Subject Matters and prepared in accordance with the Criteria.

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less

in extent than for, a reasonable assurance engagement and consequently the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed. Accordingly, we do not express a reasonable assurance opinion.

Inherent limitations

Due to the inherent limitations of any internal control structure it is possible that errors or irregularities in the information presented in the Report may occur and not be detected. Our engagement is not designed to detect all weaknesses in the internal controls over the preparation and presentation of the Report, as the engagement has not been performed continuously throughout the period and the procedures performed were undertaken on a test basis.

Restriction of use of our report

Our report should not be regarded as suitable to be used or relied on by any party wishing to acquire rights against us other than PTTEP, for any purpose or in any other context. Any party other than PTTEP who obtains access to our report or a copy thereof and chooses to rely on our report (or any part thereof) will do so at its own risk. To the fullest extent permitted by law, we accept or assume no responsibility and deny any liability to any party other than PTTEP for our work, for this independent limited assurance report, or for the conclusions we have reached.

KPMG Phoomchai Business Advisory Ltd.

Bangkok

4 March 2020

12. Content Index

GLOBAL REPORTING INITIATIVE (GRI) AND UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS (UN SDGs)

GRI STANDARD	Reference/ Remarks	External Assurance
GRI 101: Foundation 2016		
Reporting principle	SR 2019, Page 43-49	
Using the GRI Standards for Sustainability reporting	SR 2019, Page 43	
Making claims related to the use of the GRI Standards	SR 2019, Page 109-115	
GRI 102: General Disclosures 2016		
Organizational Profile		
102-1 Name of the organization	SR2019, Page 43 URL: https://www.pttep.com/en/Aboutpttep/Pttepgroup/Pttepheadquarters.aspx	
102-2 Activities, brands, products, and services	SR2019, Page 14-15	
102-3 Location of headquarters	SR2019, Back Cover URL: https://www.pttep.com/en/Aboutpttep/Pttepgroup/Pttepheadquarters.aspx	
102-4 Location of operations	SR2019, Page 14-15	
102-5 Ownership and legal form	URL: https://www.pttep.com/en/InvestorRelations/ShareholderInformation/Top10Shareholders.aspx https://www.pttep.com/en/Aboutpttep/Corporategovernance/Bylaws.aspx (Affidavit)	
102-6 Markets served	SR2019, Page 14-15	
102-7 Scale of the organization	SR2019, Page 14-15, 34-35, 99, 105 URL: https://www.pttep.com/en/InvestorRelations/FinancialPerformance/FinancialHighlight.aspx	
102-8 Information on employees and other workers	SR2019, Page 105 Relation to SDGs Targets: 8.5, 10.3	
102-9 Supply chain	SR2019, Page 78-79	
102-10 Significant changes to the organization and its supply chain	Remark: No significant changes during the reporting year	
102-11 Precautionary principle or approach	SR2019, Page 63-64	
102-12 External Initiatives	SR2019, Page 24, 29-31, 33, 36-40, 57-58, 64-65, 68-69, 73-75, 79-80, 83, 85, 89-91, 92-96	
102-13 Membership of associations	SR2019, Page 5, 7, 33, 37-40	
Strategy		
102-14 Statement from senior decision-maker	SR2019, Page 4-5	
102-15 Key impacts, risk, opportunities	SR2019, Page 16, 57-59, 63-64	
Ethics and integrity		
102-16 Values, principles, standards, and norms of behavior	SR2019, Page 8-9, 71 URL: https://www.pttep.com/en/Aboutpttep/Corporategovernance/CgandbusinessEthics.aspx Relation to SDGs Targets: 16.3	
102-17 Mechanisms for advice and concerns about ethics	SR2019, Page 61-62 URL: https://www.pttep.com/en/Aboutpttep/Corporategovernance/Reportingandwhistleblowingregulations.aspx Relation to SDGs Targets: 16.3	
Governance		
102-18 Governance Structure	URL: https://www.pttep.com/en/AboutPTTEP/Publications/PTTEPOrganizationStructure.aspx	
102-19 Delegating authority	URL: https://www.pttep.com/en/Sustainabledevelopment/Sustainabilityatpttep/SDGGovernanceStructure.aspx	
102-20 Executive-level responsibility for economic, environmental, and social topics	SR2019, Page 46 URL: https://www.pttep.com/en/Sustainabledevelopment/Sustainabilityatpttep/SDGGovernanceStructure.aspx	
102-21 Consulting stakeholders on economic, environmental, and social topics	SR2019, Page 44-46 Relation to SDGs Targets: 16.7	
102-22 Composition of the highest governance body and its committees	URL: https://www.pttep.com/en/Aboutpttep/Corporategovernance/Thecommittee.aspx Relation to SDGs Targets: 5.5, 16.7	
102-23 Chair of the highest governance body	URL: https://www.pttep.com/en/Aboutpttep/Corporategovernance/Thecommittee.aspx Relation to SDGs Targets: 16.6	

GRI STANDARD	Reference/ Remarks	External Assurance
102-24 Nominating and selecting the highest governance body	URL: https://www.pttep.com/en/Aboutpttep/Corporategovernance/CgandbusinessEthics.aspx (6.2 Selection of Directors and Chief Executive Officer) Relation to SDGs Targets: 5.5, 16.7	
102-25 Conflicts of interest	URL: https://www.pttep.com/en/Aboutpttep/Corporategovernance/CgandbusinessEthics.aspx (6.3 Roles of the Board of Directors and Management, Conflict of Interest Prevention) Relation to SDGs Targets: 16.6	
102-26 Role of highest governance body in setting purpose, values, and strategy	URL: https://www.pttep.com/en/Sustainabledevelopment/Sustainabilityatpttep/SDGovernanceStructure.aspx	
102-27 Collective knowledge of highest governance body	URL: https://www.pttep.com/en/Aboutpttep/Corporategovernance/Cgreport.aspx (Training of Directors)	
102-28 Evaluating the highest governance body's performance	AR2019, Page 118-120	
102-32 Highest governance body's role in sustainability reporting	SR2019, Page 46	
102-33 Communicating critical concerns	AR2019, Page 120-122	
102-34 Nature and total number of critical concerns	AR2019, Page 120-122	
102-35 Remuneration policies	AR2019, Page 128-133	
102-36 Process for determining remuneration	AR2019, Page 128-133	
102-37 Stakeholders' involvement in remuneration	AR2019, Page 128-132 Relation to SDGs Targets: 16.7	
Stakeholder engagement		
102-40 List of stakeholder groups	SR2019, Page 10, 44-45	
102-41 Collective bargaining agreements	All employees are covered by collective bargaining agreement Relation to SDGs Targets: 8.8	
102-42 Identifying and selecting stakeholders	SR2019, Page 44-45	
102-43 Approach to stakeholder engagement	SR2019, Page 44-45	
102-44 Key topics and concerns raised	SR2019, Page 46	
Reporting Practice		
102-45 Entities included in the consolidated financial statements	SR2019, Page 43	
102-46 Defining report content and topic boundaries	SR2019, Page 46-49	
102-47 List of material topics	SR2019, Page 11, 47-49	
102-48 Restatements of information	SR2019, Page 104	
102-49 Changes in reporting	SR2019, Page 10-11, 43, 47-49	
102-50 Reporting period	SR2019, Page 43	
102-51 Date of most recent report	Remark: Most recent previous report is 2018 PTTEP Sustainability Report.	
102-52 Reporting cycle	Remark: PTTEP publishes Sustainability Report annually.	
102-53 Contact point for questions regarding the report	SR2019, Back Cover	
102-54 Claims of reporting in accordance with the GRI Standards	SR2019, Page 43	
102-55 GRI content index	SR2019, Page 109-115	
102-56 External assurance	SR2019, Page 43, 107-108	
Material topics		
Economics		
GRI 201: Economic performance 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 57, 59	
103-2 The management approach and its components	SR2019, Page 8-9, 12-13	
103-3 Evaluation of the management approach	SR2019, Page 58-59	
GRI 201: Economic performance		
201-1 Direct economic value generated and distributed	SR2019, Page 99 Relation to SDGs Targets: 8.1, 8.2, 9.1, 9.4, 9.5	
201-2 Financial implications and other risks and opportunities for the organization's activities due to climate change	SR2019, Page 20-21, 59, 64, 88-89 Relation to SDGs Targets: 13.1	
GRI 203: Indirect economic impacts 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 92-93	

GRI STANDARD	Reference/ Remarks	External Assurance
103-2 The management approach and its components	SR2019, Page 53, 92	
103-3 Evaluation of the management approach	SR2019, Page 29-31, 53, 94-97	
GRI 203: Indirect Economic Impacts		
203-1 Development and impact of infrastructure investments and services supported	SR2019, Page 92-97 Relation to SDGs Targets: 5.4, 9.1, 9.4, 11.2	
203-2 Significant indirect economic impacts, including the extent of impacts	SR2019, Page 92-97 Relation to SDGs Targets: 1.2, 8.2, 8.3, 8.5	
GRI 204: Procurement Practices 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 76	
103-2 The management approach and its components	SR2019, Page 76-82	
103-3 Evaluation of the management approach	SR2019, Page 19, 76-82	
GRI 204: Procurement Practices		
204-1 Proportion of spending on local suppliers	SR2019, Page 19, 76-77 Relation to SDGs Targets: 8.3	
Environment		
GRI 302: Energy 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 49, 88	
103-2 The management approach and its components	SR2019, Page 20-22, 35, 88-89	
103-3 Evaluation of the management approach	SR2019, Page 35, 88-89	
GRI 302: Energy		
302-1 Energy consumption within the organization	SR2019, Page 100 Relation to SDGs Targets: 7.2, 7.3, 8.4, 12.2, 13.1	●
302-3 Energy Intensity	SR2019, Page 100 Relation to SDGs Targets: 7.3, 8.4, 12.2, 13.1	
GRI 303: Water and Effluents 2018		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 49, 91	
103-2 The management approach and its components	SR2019, Page 35, 54, 91	
103-3 Evaluation of the management approach	SR2019, Page 35, 54, 91	
GRI 303: Water and Effluents		
303-1 Interactions with water as a shared resource	SR2019, Page 91	
303-2 Management of water discharge-related impacts	SR2019, Page 91	
303-3 Water withdrawal	SR2019, Page 101 Relation to SDGs Targets: 6.3, 6.4, 8.4, 12.2	●
303-4 Water discharge	SR2019, Page 101 Omission: Information unavailable for GRI 303-4 (b, c and d), PTTEP will improve the data collection in the next reporting cycle. Relation to SDGs Targets: 3.9, 6.3, 6.4, 6.6, 12.4, 14.1	●
GRI 304: Biodiversity 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 49, 91	
103-2 The management approach and its components	SR2019, Page 54, 91	
103-3 Evaluation of the management approach	SR2019, Page 54, 91	
GRI 304: Biodiversity		
304-1 Operational sites owned, leased managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	SR2019, Page 102	
GRI 305: Emissions 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 88	
103-2 The management approach and its components	SR2019, Page 12-13, 20-22, 35, 52, 88-89, 91	
103-3 Evaluation of the management approach	SR2019, Page 20-22, 35, 52, 88-89	

GRI STANDARD	Reference/ Remarks	External Assurance
GRI 305: Emissions		
305-1 Direct Greenhouse Gas (GHG) Emissions (Scope 1)	SR2019, Page 100 Relation to SDGs Targets: 3.9, 12.4, 13.1, 14.3, 15.2	●
305-2 Energy Indirect Greenhouse Gas (GHG) Emissions (Scope 2)	SR2019, Page 100 Relation to SDGs Targets: 3.9, 12.4, 13.1, 14.3, 15.2	●
305-3 Other Indirect Greenhouse Gas (GHG) Emissions (Scope 3)	SR2019, Page 100 Relation to SDGs Targets: 3.9, 12.4, 13.1, 14.3, 15.2	●
305-4 Greenhouse Gas (GHG) Emissions Intensity	SR2019, Page 100 Relation to SDGs Targets: 13.1, 14.3, 15.2	
305-5 Reduction of Greenhouse Gas (GHG) Emissions	SR2019, Page 22, 88 Relation to SDGs Targets: 13.1, 14.3, 15.2	
305-6 Emissions of ozone-depleting substances (ODS)	SR2019, Page 100 Relation to SDGs Targets: 3.9, 12.4	●
305-7 NOX, SOX, and other significant air emissions	SR2019, Page 100 Relation to SDGs Targets: 3.9, 12.4, 14.3, 15.2	●
GRI 308: Supplier Environmental Assessment 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 76	
103-2 The management approach and its components	SR2019, Page 76-82	
103-3 Evaluation of the management approach	SR2019, Page 76-82	
GRI 308: Supplier environmental assessment		
308-1 New suppliers that were screened using environmental criteria	SR2019, Page 80	
GRI 306: Effluent and Waste 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 49, 90	
103-2 The management approach and its components	SR2019, Page 12, 23-26, 35, 54, 90	
103-3 Evaluation of the management approach	SR2019, Page 26, 35, 54, 90	
GRI 306: Effluent and Waste		
306-1 Water Discharge by quality and destination	SR2019, Page 101 Relation to SDGs Targets: 3.9, 6.3, 6.4, 6.6, 12.4, 14.1	
306-2 Waste by type and disposal method	SR2019, Page 101 Relation to SDGs Targets: 3.9, 6.3, 12.4, 12.5	●
306-3 Significant Spills	SR2019, Page 90, 101 Relation to SDGs Targets: 3.9, 6.3, 6.6, 12.4, 14.1, 15.1	●
306-4 Transport of hazardous waste	SR2019, Page 102 Relation to SDGs Targets: 12.4	
GRI 307: Environmental Compliance 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 88-91	
103-2 The management approach and its components	SR2019, Page 88-91	
103-3 Evaluation of the management approach	SR2019, Page 88-91	
GRI 307: Environmental Compliance		
307-1 Non-compliance with environmental laws and regulations	SR2019, Page 102 Relation to SDGs Targets: 16.3	
Labor Practices and Decent Work		
GRI 401: Employment 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 71	
103-2 The management approach and its components	SR2019, Page 52, 71-72	
103-3 Evaluation of the management approach	SR2019, Page 52, 71-72	
GRI 401: Employment		
401-1 New employee hires and employee turnover	SR2019, Page 105-106 Relation to SDGs Targets: 5.1, 8.5, 8.6, 10.3	
401-3 Parental leave	SR2019, Page 106 Relation to SDGs Targets: 5.1, 5.4, 8.5	

GRI STANDARD	Reference/ Remarks	External Assurance
GRI 403: Occupational Health and Safety 2018		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 49, 83-86	
103-2 The management approach and its components	SR2019, Page 13, 18, 35, 56, 83-87	
103-3 Evaluation of the management approach	SR2019, Page 35, 56, 83-87	
GRI 403: Occupational health and safety		
403-1 Occupational health and safety management system	SR2019, Page 83	
403-2 Hazard identification, risk assessment, and incident investigation	SR2019, Page 83, 85	
403-3 Occupational health services	SR2019, Page 83, 85	
403-4 Worker participation, consultation, and communication on occupational health and safety	SR2019, Page 83-84	
403-5 Worker training on occupational health and safety	SR2019, Page 84, 86-87 Relation to SDGs Targets: 3.3, 3.9, 8.8	
403-6 Promotion of worker health	SR2019, Page 87	
403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	SR2019, Page 83-87	
403-8 Workers covered by an occupational health and safety management system	SR2019, Page 103 Relation to SDGs Targets: 3.3, 3.9, 8.8	
403-9 Work-related injuries	SR2019, Page 103 Relation to SDGs Targets: 3.3, 3.9, 8.8	●
403-10 Work-related ill health	SR2019, Page 104 URL: https://www.pttep.com/en/Sustainabledevelopment/Business/Safetysecurityhealthandenvironment.aspx (Medical and Occupational Health) Relation to SDGs Targets: 3.3, 3.9, 8.8	●
GRI 404: Training and education 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 71-72	
103-2 The management approach and its components	SR2019, Page 17, 35, 52, 72-74	
103-3 Evaluation of the management approach	SR2019, Page 35, 52, 72-74	
GRI 404: Training and education		
404-1 Average hours of training per year per employee	SR2019, Page 105 Relation to SDGs Targets: 4.3, 4.4, 4.5, 5.1, 8.2, 8.5, 10.3	
404-2 Programs for upgrading employee skills and transition assistance programs	SR2019, Page 71-74 Relation to SDGs Targets: 8.2, 8.5	
404-3 Percentage of employees receiving regular performance and career development reviews	SR2019, Page 35, 74 Relation to SDGs Targets: 5.1, 8.5, 10.3	
GRI 405: Diversity and Equal Opportunity 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 71, 75	
103-2 The management approach and its components	SR2019, Page 75	
103-3 Evaluation of the management approach	SR2019, Page 75	
GRI 405: Diversity and Equal Opportunity		
405-1 Diversity of governance bodies and employees	SR2019, Page 75, 105, 106 Relation to SDGs Targets: 5.1, 5.5, 8.5	
405-2 Ratio of basic salary and remuneration of women to men	SR2019, Page 106 Relation to SDGs Targets: 5.1, 8.5, 10.3	
GRI 414: Supplier Social Assessment 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 76	
103-2 The management approach and its components	SR2019, Page 60, 76-82, 86	
103-3 Evaluation of the management approach	SR2019, Page 76-82	
GRI 414: Supplier Social Assessment		
414-1 New suppliers that were screened using social criteria	SR2019, Page 80 Relation to SDGs Targets: 5.2, 8.8, 16.1	

GRI STANDARD	Reference/ Remarks	External Assurance
Society		
GRI 413: Local Communities 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 92	
103-2 The management approach and its components	SR2019, Page 12, 27-31, 35, 53, 92-96	
103-3 Evaluation of the management approach	SR2019, Page 29-31, 35, 53, 92-97	
GRI 413: Local Communities		
413-1 Operations with local community engagement, impact assessments, and development programs	SR2019, Page 92	
GRI 205: Anti-Corruption 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 61, 63	
103-2 The management approach and its components	SR2019, Page 50, 61-63	
103-3 Evaluation of the management approach	SR2019, Page 50, 62-63	
GRI 205: Anti-Corruption		
205-2 Communication and training about anti-corruption policies and procedures	SR2019, Page 62 Relation to SDGs Targets: 16.5	
205-3 Confirmed incidents of corruption and actions taken	SR2019, Page 62 Relation to SDGs Targets: 16.5	
GRI 419: Compliance 2016		
GRI 103: Management approach		
103-1 Explanation of the material topic and its boundaries	SR2019, Page 48, 60-63	
103-2 The management approach and its components	SR2019, Page 50, 60-63	
103-3 Evaluation of the management approach	SR2019, Page 50, 61-62	
GRI 419: Socioeconomic Compliance		
419-1 Non-compliance with laws and regulations in the social and economic area	SR2019, Page 102 Remark: No cases of non-compliance with the laws and regulations Relation to SDGs Targets: 16.3	
GRI Oil and Gas Sector Disclosure		
G4-OG1 Volume and type of estimated proved reserves and production	SR2019, Page 99	
G4-OG2 Total amount invested in renewable energy	Remark: Not applicable to PTTEP business.	
G4-OG3 Total amount of renewable energy generated by source	Remark: Not applicable to PTTEP business.	
G4-OG4 Number and Percentage of Significant Operating Sites in Which Biodiversity Risk has been Assessed and Monitored	SR2019, Page 102	●
G4-OG5 Volume and Disposal of Formation or Produced Water	SR2019, Page 101	●
G4-OG6 Volume of Flared and Vented Hydrocarbon	SR2019, Page 100	
G4-OG7 Amount of Drilling Waste (Drill Mud and Cuttings) and Strategies for Treatment and Disposal	SR2019, Page 101	●
G4-OG10 Number and description of significant disputes with local Communities and indigenous peoples	Remark: No disputes with local communities and indigenous people	
G4-OG11 Number of sites that have been decommissioned and sites that are in the process of being decommissioned	Remark: No projects are in the process of being decommissioned	
G4-OG13 Number of process safety events, by business activity	SR2019, Page 104	

Remark: Blue text means indicators with added commentary in GRI Oil and Gas Sector Disclosure (OGSD)



INTEGRATED REPORTING (IR)

CAPITAL	DESCRIPTION	PAGE
Financial Capital	The pool of funds that is available to an organization for use in the production of goods or the provision of services obtained through financing such as debt, equity or grants or generated through operations or investments.	SR2019, Page 34, 72, 78, 92, 99
Manufactured Capital	Manufactured physical objects that are available to an organization for use in the production of goods or the provision of services (e.g. buildings, production, equipment and infrastructure.	SR2019, Page 14-16, 25, 34, 57-58
Intellectual Capital	Organizational, knowledge-based intangibles including intellectual property (e.g. patents, copyrights, software, rights and licenses) and organizational capital (e.g. tacit knowledge, systems procedures and protocols).	SR2019, Page 24-26, 31-34, 55, 57, 59, 65-70
Human Capital	People's competencies, capabilities and experience, and their motivations to innovate.	SR2019, Page 17-18, 34, 52, 56, 71-75, 83-87
Social and Relationship Capital	The institutions and relationships established within and between each community, group of stakeholders and other networks and an ability to share information) to enhance individual and collective well-being (e.g. shared norms, common values and behaviors; key stakeholder relationships; intangibles associated with the brand and reputation; social license to operate).	SR2019, Page 25-31, 34, 44-45, 53, 60-61, 64, 92-97
Natural Capital	All renewable and non-renewable environmental stocks that provide goods and services that support the current and future prosperity of an organization (e.g. air, water, land, minerals and forests biodiversity and eco-system health).	SR2019, Page 12-13, 20-26, 34-35, 52, 54, 88-91, 100-102



UNITED NATIONS GLOBAL COMPACT (UNGC) COMMUNICATION ON PROGRESS (COP) – ADVANCED LEVEL

 United Nations Global Compact	CRITERIA OF UNGC COP FOR THE ADVANCE LEVEL	PAGE
STRATEGY, GOVERNANCE AND ENGAGEMENT		
Scope: Implementing the Ten Principles into Strategies & Operations	1. Mainstreaming into corporate functions and business units	SR2019, Page 50-56
	2. Value chain implementation	SR2019, Page 76-82
HUMAN RIGHTS		
Principle 1: Support and respect the protection of internationally proclaimed human rights Principle 2: Not complicit in human rights abuses	3. Robust commitments, strategies or policies in the area of human rights	SR2019, Page 75-76, 79-80, 92 URL: https://www.pttep.com/en/Sustainabledevelopment/Business/Labourpractices.aspx
	4. Effective management systems to integrate the human rights principles	URL: https://www.pttep.com/en/Sustainabledevelopment/Business/Labourpractices.aspx
	5. Effective monitoring and evaluation mechanisms of human rights integration	SR2019, Page 52 URL: https://www.pttep.com/en/Sustainabledevelopment/Business/Labourpractices.aspx
LABOUR		
Principle 3: Uphold the freedom of association and the effective recognition of the right to collective bargaining Principle 4: Uphold the elimination of all forms of forced and compulsory labour Principle 5: Uphold the effective abolition of child labour Principle 6: Uphold the elimination of discrimination in respect of employment and occupation	6. Robust commitments, strategies or policies in the area of labor	SR2019, Page 71-76
	7. Effective management systems to integrate the labor principles	SR2019, Page 75-76
	8. Effective monitoring and evaluation mechanisms of labor principles integration	SR2019, Page 75-80
ENVIRONMENT		
Principle 7: Support a precautionary approach to environmental challenges Principle 8: Undertake initiatives to promote greater environmental responsibility Principle 9: Encourage the development and diffusion of environmentally friendly technologies	9. Robust commitments, strategies or policies in the area of environmental stewardship	SR2019, Page 88-91
	10. Effective management systems to integrate the environmental principles	SR2019, Page 88-91
	11. Effective monitoring and evaluation mechanisms for environmental stewardship	SR2019: Page 88-91
ANTI-CORRUPTION		
Principle 10: Work against corruption in all its forms, including extortion and bribery	12. Robust commitments, strategies or policies in the area of anti-corruption	SR2019, Page 60-63, 76, 79-80
	13. Effective management systems to integrate the anti-corruption principle	SR2019, Page 60-63, 76, 79-80
	14. Effective monitoring and evaluation mechanisms for the integration of anti-corruption	SR2019, Page 60-63, 80
UN GOALS AND ISSUES		
Scope: Taking action in support of broader UN goals and issues	15. Core business contributions to UN goals and issues	SR2019, Page 50-56
	16. Strategic social investments and philanthropy	SR2019, Page 92-97
	17. Advocacy and public policy engagement	SR2019, Page 5, 7
	18. Partnerships and collective action	SR2019, Page 24, 29-31, 33, 36-40, 57-58, 64-65, 68-69, 73-75, 79-80, 83, 85, 89-91, 92-96
GOVERNANCE		
Scope: Corporate sustainability governance and leadership	19. CEO commitment and leadership	SR2019, Page 4-5
	20. Board adoption and oversight	SR2019, Page 60-64
	21. Stakeholder engagement	SR2019, Page 44-46





Survey of Readers' Opinions

Your suggestions are valuable for the improvement of future PTTEP Sustainability Report

1 Does the report provide you with an understanding of PTTEP sustainability?

- Yes, fully Yes, partially Not at all

2 Please rate your assessment of PTTEP Sustainability Report 2019

- | | | | | |
|----------------------|----------------------------|------------------------------|---------------------------|------------------------------------|
| Completeness | <input type="radio"/> High | <input type="radio"/> Medium | <input type="radio"/> Low | <input type="radio"/> Dissatisfied |
| Topics | <input type="radio"/> High | <input type="radio"/> Medium | <input type="radio"/> Low | <input type="radio"/> Dissatisfied |
| Straightforwardness | <input type="radio"/> High | <input type="radio"/> Medium | <input type="radio"/> Low | <input type="radio"/> Dissatisfied |
| Report design | <input type="radio"/> High | <input type="radio"/> Medium | <input type="radio"/> Low | <input type="radio"/> Dissatisfied |
| Overall satisfaction | <input type="radio"/> High | <input type="radio"/> Medium | <input type="radio"/> Low | <input type="radio"/> Dissatisfied |

3 Please choose the top three material issues which influence PTTEP sustainability

- | | |
|------------------------------------------------------------------------|---------------------------------------------------------------|
| <input type="radio"/> Governance, Risk Management and Compliance (GRC) | <input type="radio"/> Contribution to Communities and Society |
| <input type="radio"/> Increasing Petroleum Reserves | <input type="radio"/> Environmental Management |
| <input type="radio"/> Lower Carbon Future | <input type="radio"/> Technology and Innovation |
| <input type="radio"/> Human Resource Preparation | <input type="radio"/> Occupational Health and Safety |
| | <input type="radio"/> Others (please specify) |

4 Please provide further comments and/or suggestions (if any)

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5 Which option best describes you as a stakeholder?

- | | | |
|----------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------|
| <input type="radio"/> Shareholder / Investor | <input type="radio"/> Employee | <input type="radio"/> Research / Academic Institute |
| <input type="radio"/> Vendor / Supplier | <input type="radio"/> NGO | <input type="radio"/> Communities surrounding PTTEP operation areas |
| <input type="radio"/> Student | <input type="radio"/> Media | |
| <input type="radio"/> Government Agency | <input type="radio"/> Others (please specify) | |

Thank you very much for your contribution



Survey of Readers' Opinions

Sustainability Report 2019

บริการธุรกิจตอบรับ



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