



PTTEP



**Sustainability
Report**

2022

The road to strengthen the nation's energy security

PTTEP operates with consideration to create the right balance of business, social, and environmental aspects for a sustainable future.

Save our world, save our future

PTTEP takes part in solving global warming issues and therefore sets forth to achieve Net Zero Greenhouse Gas Emissions by 2050 through our "EP Net Zero 2050" concept.

Exploring for Lower Carbon E&P Portfolio

Our exploration and production portfolio is managed to transform PTTEP into a lower-carbon organization. New projects with an emphasis on natural gas and greenhouse gas intensity are factored into the investment decision-making process.

EP

Production and Planet in Balance

We pursue the development of technology to reduce GHG emissions, energy and production efficiency improvement, application of renewable energy in operations, as well as emissions offsetting through the planting of trees in forests and mangroves to increase the natural carbon sink.

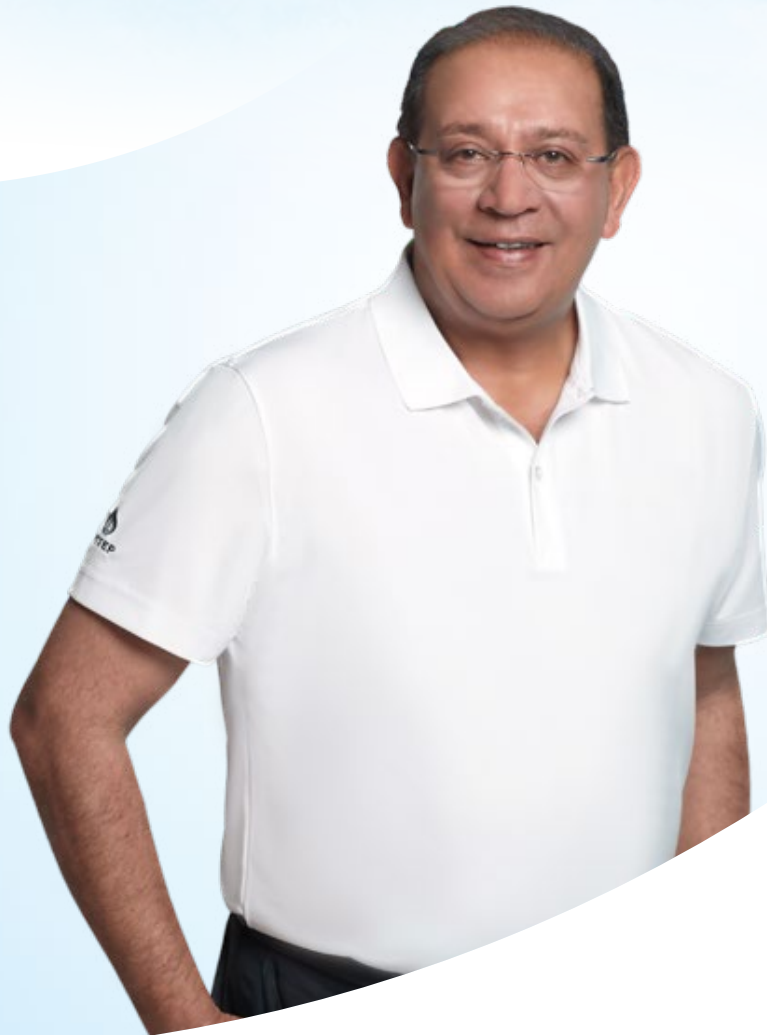
NET ZERO

2050



Contents





CEO Message

2022 was the year of “Directing the Organization amid Challenges” caused by COVID-19-induced global economic slowdown, inflation and persistent appreciation of the US dollar, and tensions between Russia and Ukraine. Importantly, PTTEP had been facing a direct business challenge from the energy transition, which has seen the global energy sector shift its focus to more environmentally-friendly energy sources.

Amid the aforementioned challenges, PTTEP introduced new strategies in response to the current and future situations with an emphasis on ensuring energy

security, building readiness for the energy transition and adapting to future challenges through new businesses while safeguarding the environment through effective greenhouse gas (GHG) management. The strategies support the United Nations Sustainable Development Goals particularly 7, 8, 12, 13, 14 and 16,



which are directly related to PTTEP activities, following PTTEP’s Sustainability Framework which focuses on striking a balance of High Performance Organization

(HPO), Governance, Risk Management and Compliance (GRC), and Sustainable Value Creation (SVC). The new PTTEP strategies include (1) **Drive Value** to strengthen E&P business, enhance the competitiveness of unit cost, and expansion in natural gas and related business. (2) **Decarbonize** to achieve Net Zero GHG Emissions target by 2050 under EP Net Zero 2050 concept as announced



at the Annual General Shareholders' Meeting held on March 28, 2022 under the avoid, mitigate, and offset concept. In this regard, we aim to expand our investment in natural gas production, include GHG emissions as a criteria in investment decision for new projects, and adoption of GHG emissions reduction technology through a Carbon Capture and Storage (CCS) project while balancing the GHG emissions with land and mangrove reforestation as well as Blue Carbon projects to increase the natural carbon sink. (3) **Diversify** by scaling up AI & Robotics Ventures Company Limited (ARV), a subsidiary of PTTEP, and exploring opportunities in renewable energy, CCS as a Service, Carbon Capture and Utilization (CCU), hydrogen, as well as other future energy.

Energy Security Reinforcement

Throughout 2022, PTTEP attained business achievements in line with our mission to provide energy security. In 2022, we were able to hit a historical production volume of more than 580,000 barrels of oil equivalent per day. Of total, natural gas accounted for 74% and the ratio is expected to keep rising. Highlights of 2022 achievements include the successful operatorship transfer of the G1/61 and G2/61 projects in the Gulf of Thailand and Yadana Project in Myanmar, which was carried out smoothly and safely, enabling us to maintain gas production. Besides this, PTTEP put maximum effort in ramp up natural gas production in many projects such as Arthit Project and the Malaysia-Thailand Joint Development Area Project (MTJDA) to reduce the impact of domestic energy costs, which rose considerably in 2022. Moreover, in Malaysia, PTTEP successfully won the exploration bid for Block SB412 in Sabah, obtained a 10-year production period extension until 2039 for the Malaysia-Thailand Joint Development

Area Project (MTJDA), and discovered natural gas at SK410B Project in Sarawak which would support PTTEP's long-term investment strategy. In the United Arab Emirates, PTTEP, in cooperation with Eni, as the operator, made a significant natural gas discovery from the first exploration well in Abu Dhabi Offshore Block 2 and acquired additional interest in Sharjah Onshore Area A following the strategy to strengthen growth in the Middle East. Meanwhile, the Algeria Hassi Bir Rekaiz Project in Algeria successfully commenced the first-phase of oil production.

Safety at Heart

With strong determination and collaboration from employees from the operational to management levels, including contractors and related stakeholders to achieve "Zero Incident Organization" target, the Safety, Security, Health and Environment (SSHE) management system is placed as the highest priority to ensure safe operations for employees and contractors and cause no impact to society and the environment. This resulted in an improving trend for the Lost Time Injury Frequency (LTIF) and the Loss of Primary Containment Rate (LOPCR), both of which are better than the latest average performance of the International Association of Oil & Gas Producers (IOGP). PTTEP commits to continuously enhancing our SSHE management system to ensure that our SSHE statistics are improved in all dimensions.

Collaboration for Sustainability

PTTEP believes that the power of collaboration can drive business, society and the environment towards sustainability. Therefore, we have been working in collaboration with various partners for sustainability. In 2022, PTTEP collaborated with multiple partners to build up technologies, particularly Carbon Capture and Storage (CCS) in which we forged partnership with leading Japanese company to explore the potential development of a CCS project in Thailand. We also partnered with companies within PTT Group to conduct a feasibility study on the CCS Hub Model to reduce GHG emissions of the companies within PTT Group and nearby areas. Meanwhile, ARV, our subsidiary, signed a Memorandum of Understanding (MOU) with Aeronautical Radio of Thailand Limited to develop the Unmanned Aircraft System Traffic Management System (UTM). ARV also partnered up with Easy Rice, an innovative digital technology company in the agriculture sector,

to improve Thai agricultural industry . In addition, ARV entered into an MOU with Dhipaya Insurance Public Company Limited to jointly develop a health platform which is an end-to-end health tech product connecting health insurance with healthy lifestyle.

Additionally, PTTEP has collaborated with other partners in creating sustainable value for wider society and the environment. For instance, we partnered with the Department of Marine and Coastal Resources, Royal Thai Navy, Hydro-Informatics Institute (Public Organization), government agencies and leading universities in implementing various social development and environmental projects including ocean science data collection in offshore areas of PTTEP operations under Ocean for Life Strategy. In this regard, PTTEP established PTTEP Ocean Data Platform, a hub that collects, exchanges and connects PTTEP ocean database to the public so that the information can be used to better protect the ocean for the sustainability of marine ecosystems and coastal economy. PTTEP also joined hands with the Department of Fisheries, Kasetsart University's Faculty of Fisheries, Prince of Songkla University and Southeast Asian Fisheries Development Center (SEAFDEC) to study the development of fisheries habitats from wellhead jackets in the Gulf of Thailand. Additionally, the collaboration with Mae Fah Luang Foundation under Royal Patronage and ARV was initiated to collect data for forest carbon credit assessment as well as increasing carbon sink and biodiversity along with economic and social development through community engagement mechanisms and technology application. This supports Thailand's goals in achieving Carbon Neutrality in 2050 and Net Zero GHG Emissions in 2065.

PTTEP Pride

PTTEP strives to continually improve our sustainability management in alignment with our business context and stakeholders' views and expectations for business sector's responsible operations, ability to cope with emerging challenges and determination to support the Sustainable Development Goals of both Thailand and the United Nations. Those commitments led to PTTEP's continuous performance improvement and resulted in various recognition and awards in 2022 from both domestic and international institutes. It's our pride to win the Sustainability Awards of Honor at the SET Awards 2022 due to receiving the Best Sustainability Awards for 3 consecutive years; Outstanding Award in

Low Carbon and Sustainable Business (LCSB) 2022 (the highest level) by Thailand Greenhouse Gas Management Organization (TGO); NACC Integrity Awards from the National Anti-Corruption Commission (NACC); Role Model Organization on Human Rights in State Enterprise sector from the Rights and Liberties Protection Department for 4 consecutive years; and International CSR Excellence Awards by The Green Organization. PTTEP aims to continually benchmark the Company's sustainability performance through various key ESG raters such as FTSE4Good, Sustainalytics, MSCI, Vigeo Eiris or Moody's ESG, S&P Global, and SET Awards with the aim to refresh our sustainability strategies based on the evaluation results and keep the momentum of our proactive strategies.



In 2022, to reflect our commitment of becoming a low-carbon organization, PTTEP has a direction to produce our Sustainability Report and Annual Report (Form 56-1 One Report) in a digital format, without printing, to reduce GHG emissions while meeting new normal lifestyles.

I do believe that the world can be a better place with everyone's support. My appreciation goes out to all management and employees for their One Team, One Goal spirit as well as shareholders, business partners, suppliers, relevant government agencies, society and communities for their strong support in driving PTTEP under the foundation of the Sustainability Framework, allowing us to be able to deliver a better future to the next generation.

It is in our hands to make the world a better place for everyone.

(Montri Rawanchaikul)
Chief Executive Officer

Stakeholders' Voices



Mr. Athapol Charoenshunsu

Director General

Department of Marine and Coastal Resources

Acting Director General

Department of National Parks, Wildlife and Plant Conservation

“ PTTEP with offshore energy operations has collaborated with the Department of Marine and Coastal Resources in driving and pushing forward forest activities to absorb the country's greenhouse gas emissions. We have jointly planted mangrove trees to capture and store CO₂, in support of the Thai government's commitment to reach carbon neutrality in 2050 and Net Zero GHG Emissions in 2065. The activities also help conserve and restore encroached or degraded mangrove forests as well as the ecosystems, preserve the biodiversity as well as direct and indirect benefits and improve the quality of life of coastal communities through a new way of living that sustainably safeguards the country's overall environment. ”

“ PTTEP's EP Net Zero concept is an essential part in supporting the national greenhouse gas emissions reduction target and can be a role model for other organizations. The concept is clear and integrates the BCG Model that encompasses biodiversity conservation, protection and value enhancement as well as the circular economy and green economy concepts. It also emphasizes ESG in alignment with the national approach. ”



Mr. Jiravat Ratisoonthorn

Deputy Secretary-General

Office of Natural Resources and
Environmental Policy and Planning



Professor Bundhit Eua-Arporn, Ph.D.

**Chairman of the Corporate Governance and
Sustainable Development Committee**

PTT Exploration and Production Public Company Limited

“ PTTEP is on the right track to having set EP Net Zero concept and targets based on appropriate principles, primarily to deal with Scope 1 and Scope 2 greenhouse gas emissions, which is what we can directly take care of. To achieve the targets, we emphasize strategic management that entails CCS and CCU. We should strike a balance between the suitability and opportunity in developing the technologies for long-term revenue. These technologies will not only demonstrate PTTEP's efforts in easing global warming but also create business sustainability as well as returns to shareholders. ”



M.L. Dispanadda Diskul

Chief Executive Officer

The Mae Fah Luang Foundation
under Royal Patronage

“ Over the past decade, climate change has been the single largest factor that affects everything and everyone on Earth. It is our responsibility to reduce greenhouse gas emissions and keep global temperatures from rising more than an additional 1.5 degrees Celsius. As Thailand's national petroleum exploration and production company, I fully support PTTEP's goal to achieve net zero greenhouse gas emissions. I greatly appreciate PTTEP's commitment to supporting the Foundation's forest protection initiative, which takes care of the communities in the area through the redistribution of revenue from carbon credits, building a sustainable world for all of us. ”



M.L. Peekthong Thongyai

Senior Executive Vice President, Gas Business Unit
PTT Public Company Limited

“ EP Net Zero 2050 is a suitable strategy to answer the national agenda. PTTEP has expertise in oil and gas exploration and production, which will be beneficial for CCS project implementation to achieve the goal. In addition, the knowledge and technology of PTTEP can help to accelerate the transition to the PTT Group's target and will be new S-Curve for PTT Group in the future. ”



Mr. Ken Takagi

General Manager

Mitsui Oil Exploration Co., Ltd.

“ Net Zero Greenhouse Gas Emissions by 2050 is only achievable with multiple efforts from everyone. We all realize the impact on our world from climate change. Hence, it is becoming increasingly important for both private sectors and government entities to act responsibly in supporting the creation of a sustainable society. ”

“ Air Liquide's expertise in providing customers with efficient, reliable, innovative technologies and solutions is at the heart of our ambitions to support the decarbonization of industries. We are pleased to partner with PTT Exploration and Production and to be one of the contributors for the development of Asia's first green e-methanol plant to convert captured biogenic CO₂ into green e-methanol, a low-carbon fuel, that could enable a significant reduction in greenhouse gas emissions. ”



Dr. Jan Kollmus

Managing Director

Air Liquide Singapore Private Limited

“ In 2022, PTTEP together with the Department of Marine and Coastal Resources (DMCR) selected an area on the east side of Pak Phanang mangrove for rehabilitation. The mangrove and fishery conservation community in Ban Kong Khong was then contracted to grow trees to tackle global warming and maintain the reforested area and enjoyed a higher income. They also supported the establishment of a forest conservation network. The rehabilitated mangrove became the habitat of marine life and coastal communities can use the resources in the abundant ecosystem. Thanks to PTTEP and DMCR for their supports and effort in conserving this forest plot for the next generation. ”



Mr. Sinchai Nanthawong

Secretary

Ban Kong Khong Mangrove and Coastal Fisheries
Conservation Group, Pak Phanang East Subdistrict,
Pak Phanang District, Nakhon Si Thammarat Province

“ Tackling global warming requires actions from multiple parties. One key area of focus is technology, specifically Carbon Capture, Utilization and Storage (CCUS), to capture CO₂, store it, and put it to use. I have been monitoring PTTEP's development of this technology in Thailand, and I hope that it will create positive impacts and bring economic benefits to all Thais while also helping Thailand to reach its Net Zero target by 2065. ”



Mr. Nakarin Wanakijpaibul

Chief Executive Officer and Executive Editor
THE STANDARD

About This Report

PTT Exploration and Production Public Company Limited (PTTEP) prepared the Sustainability Report 2022 to publicize the performance of PTTEP operational control activities and material issues in economic, social and environmental dimensions to stakeholders. The information appearing in this report covers the performance from January 1 through December 31, 2022.

Reporting Approach

The information disclosed in this report covers significant issues that may cause economic, social and environmental impacts for PTTEP operational control activities of petroleum exploration and production. This report is completed under the guidelines of Global Reporting Initiative Standards (GRI Standards) in “Accordance” criteria with the Core level under Oil and Gas Sector Disclosures (OGSD) and other international sustainability reporting frameworks such as International Petroleum Industry Environmental Conservation Association (IPIECA)’s Oil and Gas Industry Guidance on Voluntary Sustainability, Dow Jones Sustainability Indices (DJSI), AA1000 AccountAbility Principles Standard 2018 (AA1000APS), and Sustainability Accounting Standards Board (SASB)’s Materiality Map™. PTTEP is determined to improve the quality of sustainability reporting to lift the disclosure level in line with Integrating Reporting (IR) Framework which better demonstrates the correlations of sustainable development and financial operations which can shape the organization’s future reporting plan.

This report contains material issues and outstanding sustainability performance in 2022, under PTTEP’s Sustainability Framework and Strategy. Details of the execution and results are posted on PTTEP’s website under “Sustainability” Section, which is the central information portal for easy online access.

The selected information on safety, occupational health and environment, and ratio of basic salary and remuneration of women to men in this report as well as details of the execution were verified for accuracy and completeness according to AA1000APS principles concerning stakeholders’ engagement, the scope of material issues, and responses to stakeholders’ expectations. This report received Limited Assurance from KPMG Poomchai Business Advisory Limited. The assurance statement was shown in “Assurance Statement” Section on PTTEP’s website. Meanwhile, the public accountant certified by the State Audit Office of the Kingdom of Thailand conducted the accounting audit and the auditor’s report and financial performance were shown in the Annual Report 2022 (56-1 One Report).

Scope of the Report

The information contained in this report concerns the Company and PTTEP’s operational control activities of petroleum exploration and production in Thailand and overseas. The detailed scope of reporting is shown in PTTEP’s website under “Sustainability Performance Data” Section. In 2022, PTTEP material issues were updated to 12 issues in total while there were 8 issues in 2021, as shown in “Sustainability Framework and Strategy” Section on PTTEP’s website. The summary reporting of sustainability

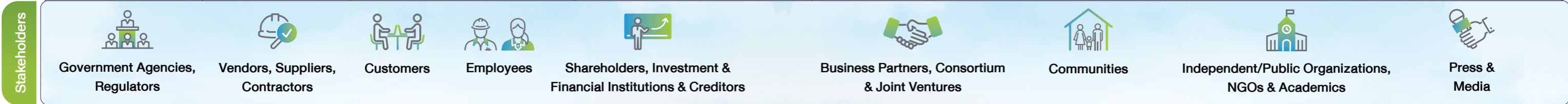
is also included in the 2022 Annual Report (Form 56-1 One Report). The information on economic performance is the same set as appeared in 2022 Annual Report (Form 56-1 One Report), which covers all projects in exploration and production activities, invested and operated by PTTEP. In addition, environmental and social performances are reported from PTTEP operations as operators. As a subsidiary of PTT Public Company Limited, PTT’s Sustainability Report encompasses PTTEP’s information.

Value Creation: From We to World

Input	Financial Capital	Production Capital	Human Capital	Intellectual Capital	Social and Relationship Capital	Natural Resources Capital
	<ul style="list-style-type: none"> Unit Cost*: USD 28.36 per barrel of oil equivalent Interest-bearing liabilities*: USD 3,833 million Debt to equity ratio* <0.5 times Shareholders' equity*: USD 13,515 million (Ordinary shares 3,969,985,400 shares) <p>*Financial Position as of December 31, 2022</p>	<ul style="list-style-type: none"> 47 projects in 15 countries Net procurement value: USD 1,719 million Over 350 initiatives for efficiency improvement and cost reduction 	<ul style="list-style-type: none"> 5,173 employees with more than 20 nationalities 1,922 suppliers Suppliers, dealers and business partners' skills and experiences Average 96 hours per year for employees' development and training Total spending on training and development: USD 7.0 million More than 1,000 employees participating in training related to climate change 	<ul style="list-style-type: none"> Total spending on technology and innovation development: USD 7.0 million including technology related to greenhouse gas management: USD 2.4 million Total spending on business development study (Beyond E&P): USD 2.7 million Collaboration with 28 external organizations on technology and innovation development 	<ul style="list-style-type: none"> Total spending on CSR projects including GHG emissions reduction projects: USD 9.3 million Employee volunteering on CSR projects more than 12,000 hours Total spending on Ramp up CSR around Ocean workstream under Ocean for Life Strategy: USD 4.4 million <ul style="list-style-type: none"> 6 flagship projects under Ramp up CSR around Ocean 55 community networks support for conservation activities in Songkhla, Pattani, Nakhon Si Thammarat, Prachuap Khiri Khan, Surat Thani, Chumphon, Phetchaburi, Samut Songkhram, Samut Sakhon, Chonburi, Rayong and Chanthaburi Provinces Total spending to support sustainability collaboration networks: USD 1.3 million 	<ul style="list-style-type: none"> Total spending on GHG management: USD 32.9 million <ul style="list-style-type: none"> GHG emissions reduction projects: USD 31.3 million Offsetting projects including blue carbon: USD 1.6 million Total spending on Ocean Health & Biodiversity Monitoring workstream under Ocean for Life Strategy including PTTEP Ocean Data Platform: USD 1.7 million Total spending on environmental management: USD 21.1 million Energy consumption: 36.2 million gigajoules Water consumption: 0.7 million cubic meters



Output / Value Creation	Deliver competitive and sustainable returns to shareholders, investors, the government, and business partners	Ensure national energy security in response to economic needs	Build employees' capabilities, improve suppliers' capabilities, and assure all relevant persons of safety	Enhance competitiveness, prepare for energy transition and future challenges, and develop technology and innovations for social and environmental benefits	Grow community economy and build good relationship with community and wider society	Mitigate environmental impacts caused by the operations, enrich natural resources, ecosystems, biodiversity and secure community trust and confidence in the operations at all operational sites
	<ul style="list-style-type: none"> Total revenue: USD 9,660 million Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA): USD 7,103 million Net profit: USD 1,999 million Royalty and taxes: USD 2,310 million Dividend payout ratio per net income: 53%, or dividend yield: 5.24% Return on Capital Employed (ROCE): 16.36% Credit ratings: BBB+ (S&P), Baa1 (Moody's), BBB+ (Fitch), AAA (TRIS) 	<ul style="list-style-type: none"> More than 580,000 barrels of oil equivalent per day (hit historical production volume) with 74% natural gas Crude oil, condensate and LPG production: 50 million barrels of oil equivalent Natural gas production reaching 955 billion cubic feet (134 million barrels of oil equivalent) Proved reserves: 1,442 million barrels of oil equivalent with 75% natural gas 	<ul style="list-style-type: none"> Lost Time Injury Frequency (LTIF) and Total Recordable Injury Rate (TRIR) at 0.15 and 0.88 (No. per million manhours) respectively 100% of suppliers passing Environmental, Social, and Governance (ESG) screening criteria 100% of individual competency reviewed, 88% completing individual development plan Employees' competency increased by 5.94% compared to 2021 More than 80% of employees participating in campaigns related to climate change 74% employee engagement score 100% of employees acknowledging and completing training on Good Corporate Governance and Business Ethics (CG&BE) 	<ul style="list-style-type: none"> 65 technology projects in development phase with 12 greenhouse gas emissions reduction projects Accumulated 14 projects implemented with a return of USD 24 million Accumulated intellectual properties (28 granted patents, 9 registered software copyrights, 51 pending patents applications) Expected new businesses: CCS, green hydrogen production, green e-methanol production, renewable energy power plant and Gas to Power/LNG to Power power plant 	<ul style="list-style-type: none"> 142 CSR projects in 4 aspects – basic needs, education, environment and culture 81 tonnes of CO₂ equivalent of GHG emissions reduction from waste to energy for community project Average social return on investment 3.55 : 1 from 28 CSR projects 2.52 of community commitment level Achieved net positive impact on ocean biodiversity and ecosystem services (BES) values in all offshore operations: 44.7% Community income of focused communities increased by 20.5% (before PTTEP project implementation) 3,563 of conservation networks established More than 100,000 participants attending sustainability conferences and sessions jointly supported by PTTEP and various collaboration networks 	<ul style="list-style-type: none"> Accumulated greenhouse gas emissions avoidance and reduction since 2013 at 8.9 million tonnes of CO₂ equivalent (from the base year 2012) 2022 GHG emissions reduction of 166,352 tonnes of CO₂ equivalent (from the base year 2020) 1,000-rai mangrove plantation completed and approval of mangrove areas of 4,000 rais obtained Study results of other blue carbon projects, i.e. seagrass plantation and blue carbon for cultivation by seaweeds and seashells in the Gulf of Thailand PTTEP Ocean Data Platform that includes meteorological and oceanographic data and PTTEP's project implementation with more than 600 views Energy consumption and energy recovery reduced by 8.5 million gigajoules Zero produced water discharge to environment* Zero hazardous waste and industrial waste to landfill* Waste diverted from disposal by 19.3% of total waste <p>*For operations in Thailand only</p>



Sustainability at PTTEP

The Board of Directors plays a vital role as the leader and advocate of sustainability that pushes for concrete implementation, to ensure PTTEP is on the path towards being a sustainable organization. While the Board of Directors set forth the Sustainability Statement as a guideline for all employees and stakeholders, the Corporate Governance and Sustainable Development Committee is tasked to supervise and promote overall sustainability actions. The implementation is monitored on a quarterly basis.

Sustainability Statement

PTTEP's sustainability means being a responsible and resilient organization. We aim to embrace energy transition and create sustainable value to the Company and our stakeholders with commitment to achieving Net Zero Greenhouse Gas Emissions by 2050. Our Sustainability Framework is based on 3 pillars: High Performance Organization (HPO); Governance, Risk Management and Compliance (GRC); and Sustainable Value Creation (SVC).

While growing our business through the gas value chain, we will diversify beyond E&P with focus on technology and innovation, decarbonization, and future energy. Our competitiveness is driven by robust operations and efficiency improvement. We strive to become a GRC role model and zero incident organization. At PTTEP, we operate responsibly to ensure business sustainability with due care for the community, society and the environment.

Approved by PTTEP's Board of Directors on 19 August 2022



» Sustainability Framework

In line with the “Sustainability Statement”, PTTEP is set to follow a Sustainability Framework that comprises 3 main components, namely (1) High Performance Organization (HPO), (2) Governance, Risk Management and Compliance (GRC) and (3) Sustainable Value Creation (SVC) to support the Sustainable Development Goals of Thailand and the United Nations, focusing on SDGs 7, 8, 12, 13, 14 and 16 which are directly related to the Company’s business operations. PTTEP is confident that under a strong business foundation together with a conscious consideration of all stakeholders’ interests, PTTEP will be able to deliver sustainable value to the world (From We to World) and consequently achieve its vision of becoming the “Energy Partner of Choice”.



HPO

High Performance Organization (HPO)

Emphasizing continuous performance improvement to become more effective, efficient, and productive in response to the energy transition with a focus on technology and innovation, decarbonization and future energy.

GRC

Governance, Risk Management and Compliance (GRC)

Emphasizing transparent and efficient operations for the organization’s stability and sustainability through governance, appropriate risk management, and internal control as well as strict compliance with relevant laws and regulations.

SVC

Sustainable Value Creation (SVC)

Emphasizing long-term value creation for all stakeholder groups through organizational sustainability, responsible operations, natural resource conservation, environmental rehabilitation as well as community and social development.

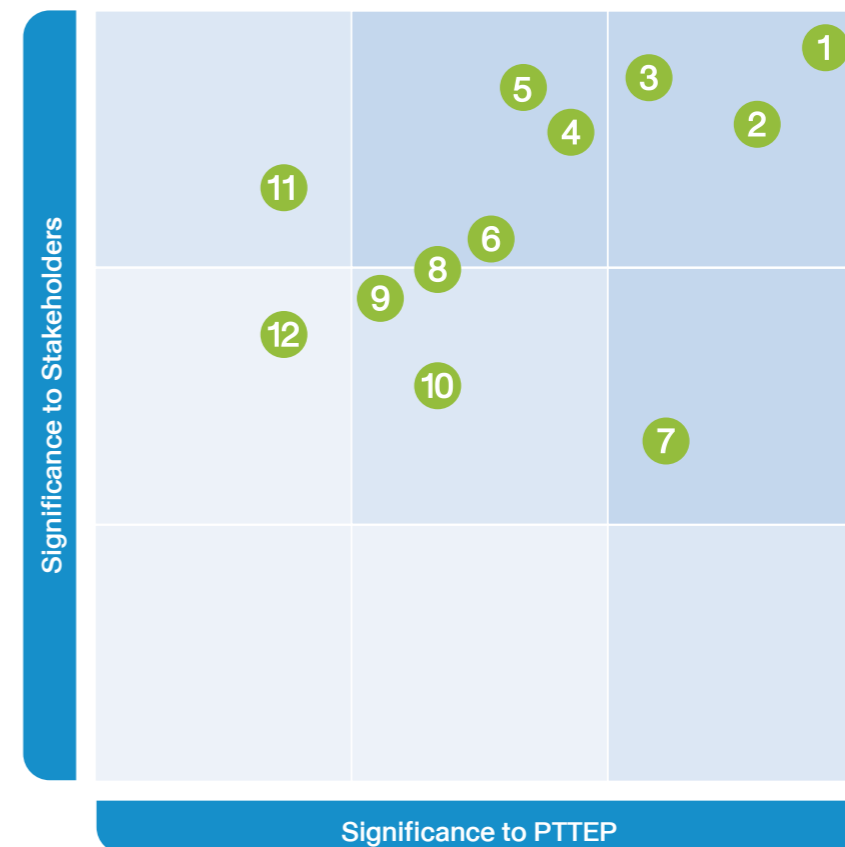


Materiality Assessment

In 2022, PTTEP assessed and reviewed material issues on sustainability encompassing Environmental, Social and Governance (ESG) issues and consider in 2-dimensions aspects or issues which were of significance to PTTEP and of significance to stakeholders which are (1) Government Agencies and Regulators (2) Vendors, Suppliers/ Contractors (3) Customers (4) Employees (5) Shareholders, Investment and Financial Institutions and Creditors (6) Business Partners, Consortium and Joint Ventures (7) Communities (8) Independent/ Public Organizations, NGOs and Academics (9) Press and Media.

The 2-dimensional issues were prioritized accordingly to the Global Reporting Initiative Standards: GRI Standards (2021) and AA1000 Accountability Principles: AA1000APS (2018). The material issues reflected national and international sustainability trends that corresponded with the United Nations Sustainable Development Goals and Sustainability Accounting Standards Board's SASB Materiality Map™ for Oil & Gas – Exploration & Production Industry. The materiality assessment results served as a crucial input for developing and improving corporate strategies.




2022 PTTEP's Material Issues



- 1 Energy Transition towards Net Zero
- 2 Technology and Innovations
- 3 Governance, Risk Management and Compliance
- 4 Safety, Security, Health and Environment
- 5 Contribution to Communities and Society
- 6 Human Resource Preparation
- 7 Circular Economy
- 8 Biodiversity Management
- 9 Supply Chain Management
- 10 Cybersecurity
- 11 Human Rights
- 12 Stakeholder Management

Sustainability Strategy

As guided by the Sustainability Framework and material issues, PTTEP sets 3 main strategy pillars as well as other strategies to strengthen our sustainability performance covering Environment, Social and Governance (ESG) dimensions. PTTEP's sustainability strategies and long-term targets are as follows:

	 DECARBONIZE	 DRIVE VALUE	 DIVERSIFY
Strategy	<ul style="list-style-type: none"> Manage E&P for lower carbon portfolio Execute greenhouse gas emissions reduction plan through technology application Accelerate Carbon Capture and Storage (CCS) projects, maximize the use of renewables and look for future energy application opportunity Pursue emission offsetting through initiatives such as forestation and Blue Carbon to absorb CO₂ in coastal and marine ecosystem under Ocean for Life Strategy 	<ul style="list-style-type: none"> Strengthen E&P and ensure Thailand's energy security <ul style="list-style-type: none"> Maximize production Expedite project development Monetize discovery Enhance the competitiveness of unit cost Expand gas-weighted portfolio and LNG business 	<ul style="list-style-type: none"> Scale-up AI & Robotics Ventures Company Limited Capture Gas to Power and renewable energy opportunity Explore Carbon Capture, Utilization and Storage (CCUS), hydrogen and future energy Commercialize in-house technology
Long-Term Target	<ul style="list-style-type: none"> Achieve net zero greenhouse gas emissions by 2050 Reduce greenhouse gas emissions intensity by at least 30% within 2030 and 50% by 2040 (with the base year 2020) 	<ul style="list-style-type: none"> Sustain 5% average production growth (CAGR) Maintain reserves to production ratio (R/P) to be greater than 5 years Maintain competitive unit cost for E&P to be less than USD 25 per barrel of oil equivalent Become a zero incident organization 	<ul style="list-style-type: none"> Achieve 20% contribution to Net Income from Beyond E&P business in 2030
Deepen and Broaden Sustainability			
Strategy	<ul style="list-style-type: none"> Focus on effective integration of assurance processes Cultivate GRC in employee mindset to be aware, accept and implement GRC in daily operation and key decision-making Transform the organization and work process in response to future challenges Redesign work processes to maximize resource efficiency Conserve and rehabilitate marine resources and ecosystem for sustainability 		
Long-Term Target	<ul style="list-style-type: none"> Become GRC role model among Thai listed companies Increase GRC maturity level to the highest level at level 5 (Continuous Improvement with Automation) Reduce production cost and increase production through the adoption of digital technology that will improve E&P efficiency Enhance executives and staff's thinking capacity and life skills, preparing for new work norms and future requirements At least 50% of main structures must be reused, with safety awareness and efficient conditions by 2030 Zero waste to landfill by 2030 Achieve net positive impact on ocean biodiversity & ecosystem services value for all offshore operations by 2030, compared to the base year 2019 Increase focused communities' income by 50% and establish 16,000 conservation networks by 2030, compared to baseline data before PTTEP project implementation 		

PTTEP supports the Sustainable Development Goals of Thailand and the United Nations, focusing on SDGs 7, 8, 12, 13, 14 and 16 which are directly related to the Company's business operations.



Highlight Performance

Performance in 2022



Net profit: USD **1,999** million

More than **580,000** barrels of oil equivalent per day which hit historical production volume



Innovation and technology development: **65** projects



Employees' competency both in PTTEP corporate and international assets increased by **5.94%** compared to 2021 employees' competency



Total revenue: USD **9,660** million



Exploration and Production activities: **47** projects in **15** countries

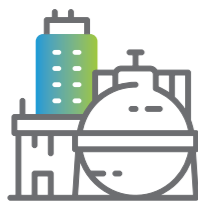
100% of employees completing CG&BE e-Learning



Maintained **100% CG&BE acknowledgment** by employees



Revised Human Rights Policy in alignment with international human rights standards and due diligence



Proved reserve to production ratio (R/P ratio or Reserves Life): **6.8** years

Dividend yield: **5.24%**



Zero hazardous waste and industrial waste to landfill*



Waste diverted from disposal: **19.3%** of total waste



Zero produced water discharge to environment*



Accumulated GHG emissions avoidance and reduction of approximately **8.9** million tonnes of CO₂ equivalent from 2013 (the base year 2012)

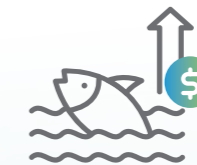


Unit cost: USD **28.36** per barrel of oil equivalent



Average social return on investment **3.55 : 1** from **28** CSR projects

Achieved net positive impact on ocean biodiversity and ecosystem services (BES) values in all offshore operations: **44.7%**



ARV's revenue growth and selling growth rates increased by **3** times or **30%** from 2021



Production growth rate: **18%**



LTIF **0.15** Better than the latest average of the International Association of Oil & Gas Producers (IOGP)



Increased community income of focused communities participating in Aquatic Animal Hatchery Learning Center and Seafood Product Value Enhancement Project: **20.5%**



*For operations in Thailand only

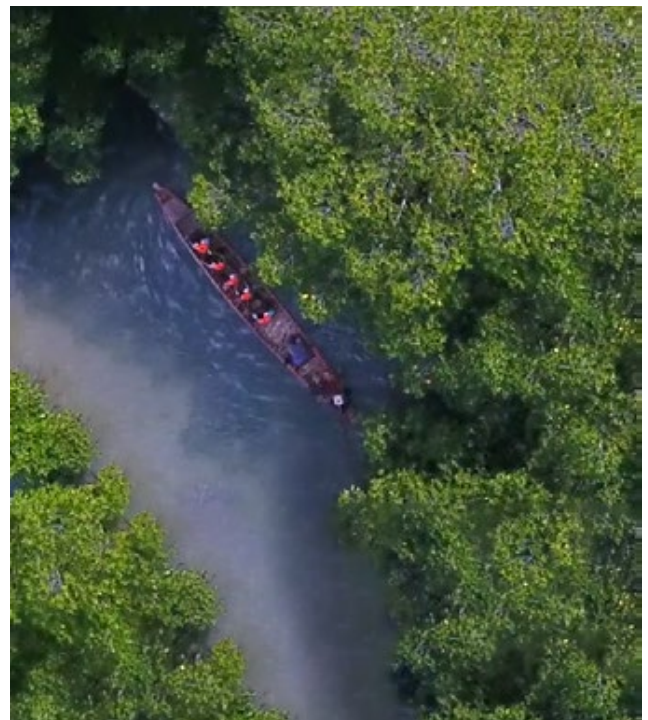


Decarbonize

Decarbonize



Driven by our ambition and determination to operate our business while striving to achieve the right balance of social and environmental aspects and creating shared value for stakeholders for sustainability, PTTEP is taking part in greenhouse gas management and fight against global warming. Our efforts are geared towards responses to climate risks and associated opportunities that may affect the overall picture of economic, social and environment. Those risks include the increasing frequency of natural disasters, stringent laws and regulations in both the national and international levels and the push for energy transition to a low-carbon society. PTTEP has, therefore, launched successive initiatives in response to those challenges, while exploring emission reduction solutions in line with global trends and Thailand's commitment. Our key actions since 2013 are summarized as follows:



PTTEP Having Joined Forces to Reduce Greenhouse Gas since 2013

PTTEP has a strong ambition to take part in minimizing the impact of climate change, which is considered as national and global issues that need immediate action, to pass on a better world to the next generation. Since 2013, PTTEP has set a target to reduce GHG emissions intensity from our E&P activities under PTTEP’s operational control covering Scope 1 and Scope 2 emissions by at least 25% within 2030 (from the base year 2012). Throughout the past decade, PTTEP was committed to continually reducing greenhouse gas emissions (GHG emissions) through the implementation of various projects in both domestic and international assets.

In 2022, PTTEP was able to avoid and reduce GHG emissions intensity by more than 25%, 8 years ahead of plan with accumulated emissions reduction of approximately 8.9 million tonnes of CO₂ equivalent or equivalent to the growing of trees on 9.3 million-rai areas* since 2013.

The intensity reduction was achieved by: (1) Exploration and Production Portfolio (E&P Portfolio) management and well management which avoided GHG emissions by approximately 5.9 million tonnes of CO₂ equivalent and (2) Application of various technologies to reduce GHG emissions from the production process, for example, recovery flare gas or excess gas went back into the production process for further utilization, energy efficiency improvement, production efficiency improvement, reduction of methane leak, adoption of renewable energy in operations, and logistic fleet management to increase efficiency of vessel transportation by optimizing fleet and cargo to reduce fuel consumption. With our efforts, PTTEP has reduced GHG emissions by approximately 3 million tonnes of CO₂ equivalent. Besides, PTTEP has gained more than USD 220 million in accumulated economic benefits.

Accumulated GHG Emissions Reduction from the Production Process from 2013–2022

(Tonnes of CO₂ equivalent)



Flare Gas Recovery and Utilization
1,910,000



Product Efficiency Improvement and Renewable Energy
363,000



Energy Efficiency
692,100



Methane Leakage Control
34,400

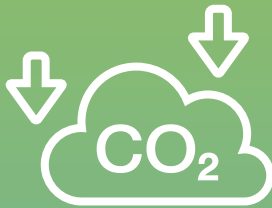
*Calculated from local slow-growing plants as appeared in TGO’s plant capacity manual (June 2011)



The target was achieved

8 years
ahead of plan

(The Goal to reduce GHG emissions intensity by at least 25% within 2030 from the base year 2012)



Accumulated GHG avoidance and reduction of approximately

8.9

million tonnes of CO₂ equivalent



The growing of trees on

9.3
million-rai areas*

*Calculated from local slow-growing plants as appeared in TGO's plant capacity manual (June 2011)



Mr. Dittapon Soothi-O-Soth

Senior Vice President,
Thai Offshore 2 Asset
PTTEP

“Taking care of the environment while ensuring energy security in a balanced and sustainable manner poses a challenge to the energy business. Reducing greenhouse gas emissions associated with production requires experience, competency and commitment from all executives and employees.”



PTTEP's Pathway towards Low-Carbon Organization under Net Zero 2050

PTTEP commits to actively and continuously taking part in fighting against climate change to support UN SDG 13: Climate Action and Thailand's goals to reach carbon neutrality in 2050 and Net Zero GHG Emissions in 2065 as part of the commitment to the UN Climate Change Conference of the Parties (COP26).

In March 2022, PTTEP accordingly announced the Net Zero GHG Emissions by 2050 target for the exploration and production business under PTTEP's operational control covering Scope 1 and Scope 2 emissions. The target will be achieved through “EP Net Zero 2050” concept and 2 interim targets are set, aiming to reduce emissions intensity by at least 30% within 2030 and by 50% within 2040 from the base year 2020. The updated base year makes our targets more challenging and reflects our commitment to seriously combatting climate change. Under “EP Net Zero 2050” concept, we set forth the following plans:

PTTEP's Goal to Achieve Net Zero GHG Emissions in 2050



EP NET ZERO 2050

GHG Intensity Reduction

Operational Control
(Scope 1 + Scope 2)



30% in 2030



50% in 2040

From the Base Year 2020

E | Exploring for Lower Carbon E&P Portfolio

The E&P Portfolio is managed to transform PTTEP into a low-carbon organization (Portfolio Management). In this regard, PTTEP will invest in projects that conform with the Net Zero GHG Emissions target. The GHG Management Criteria for Investment Decision Guideline is prepared, whereby emissions intensity is factored into the investment decision-making process.

P | Production and Planet in Balance

PTTEP will pursue the development of technology to reduce GHG emissions from the production process, moving forward with Zero Routine Flare target for new projects, in particular Carbon Capture and Storage (CCS) that captures emissions and injects and sequesters in the reservoirs. We will also aim to maximize the use of renewable energy, i.e. solar and wind power and explore new forms of future energy such as hydrogen for generating of power for operating assets. Moreover, PTTEP is studying Carbon Capture and Utilization (CCU), the technology that will convert CO₂ to valuable products or future materials. These approaches are on top of existing GHG emissions reduction schemes.

PTTEP strives to balance environmental protection and shared values for stakeholders for mutual and sustainable growth, through the planting of terrestrial and mangrove forests that will increase the natural carbon sink with a target to absorb more than 2 million tonnes of CO₂ in 2050. Meanwhile, social and environmental projects under the Ocean for Life Strategy will be continuously conducted to improve the abundance of biodiversity in marine ecosystems as healthy oceans and coastal ecosystems are efficient sources of carbon sinks. In addition, PTTEP is seeking opportunities to secure carbon credits from various platforms and develop advanced technologies to absorb CO₂ directly from the atmosphere.

Carbon Capture and Storage (CCS)

PTTEP leverages E&P knowledge and experience in geosciences and engineering in implementing CCS amidst the energy transition movement to become a low-carbon organization and create sustainable growth. PTTEP has initiated Thailand's first CCS project study in 2021 at Arthit Project, an offshore gas exploration field in the Gulf of Thailand operated by PTTEP. The project's front-end engineering and design (FEED) is underway and PTTEP expects to execute CCS technology at Arthit Project in 2026, which will reduce emissions from the petroleum production process by approximately 700,000 - 1,000,000 tonnes of CO₂ per annum. The CCS project study is concurrently taking place at Lang Lebah field, in Malaysia SK410B Project, a huge gas field discovered by PTTEP in Malaysia.



PTTEP initiated

Thailand's First CCS project study at Arthit Project,

expecting to reduce CO₂ emissions by approximately

700,000 – 1,000,000

tonnes of CO₂ per annum

Blue Carbon Project

Another key project to achieve Net Zero GHG Emissions by 2050 and support the Ocean for Life Strategy is to manage GHG by offsetting through various projects under Blue Carbon. This is where CO₂ is absorbed by oceans and coastal ecosystems from the process of sequestering CO₂ in the form of biomass. It is estimated that the Blue Carbon Project (i.e. mangrove, seagrass and coral reefs) has a carbon storage capacity about 10 times higher than terrestrial forests. It can also increase biodiversity and provide a source of coastal aquatic life to improve the quality of life and economy of the surrounding communities, as well as contribute to the increase in Thailand's Ocean Health Index (OHI). Currently, PTTEP has conducted various Blue Carbon projects, including:

1) Mangrove Forestation Project

PTTEP is set to complete 45,000-rai mangrove forestations in 2030, to absorb more than 1.1 million tonnes of CO₂ equivalent in 2050. Local workers are hired through agencies registered with the Department of Marine and Coastal Resources, to plant and preserve mangrove forests in the areas. A sustainable conservation network is created as a result, to support job creation, career development and income distribution to communities. In 2039, the network is expected to encompass more than 18,000 participants.

PTTEP's mangrove forestation project completely covered 1,000-rai areas in 2021. In 2022, PTTEP received the Department of Marine and Coastal Resources' approval to grow trees on an additional 4,000-rai areas as a carbon-offsetting scheme. In addition, PTTEP collaborated with Kasetsart University on biodiversity research in forested areas. Under the forestation plan, the additional plantation will be conducted to complete all 45,000-rai areas in total by 2030. PTTEP will continue collecting data for research study and monitor the mangrove forestation efficiency until 2039.




2) Feasibility Study for Plantation of Seagrass and Others

PTTEP, in collaboration with Kasetsart University's Faculty of Fisheries, has surveyed potential locations and techniques for seagrass meadows. The project was kicked off in 2022. The technique of planting by seed propagation, isolation and tissue culture were used to study the survival rate of seagrass grown in its natural environment at Ko Taen, Surat Thani Province. Besides, CO₂ storage database of the area was developed for further studies. Additionally, PTTEP has conducted preliminary research with Chulalongkorn University on potential seaweeds and seashells that are best for CO₂ absorption and can grow well in the Gulf of Thailand. The next phase is to develop pilot-scale cultivation in a laboratory and the Gulf of Thailand.



Mangrove Forestation




In 2021, completed **1,000**-rai mangrove forestations

In 2022, approved additional area of **4,000**-rai mangrove forestations

Between 2023-2030, plan to complete additional **40,000**-rai mangrove forestations

Blue Carbon



CO₂ absorption is more than land forest by **10** times*

*Refer to Thailand Greenhouse Gas Management Organization





Drive Value

Business Overview

PTTEP Group's core business is exploration and production of petroleum in Thailand and overseas. As of December 31, 2022, PTTEP Group had 47 petroleum exploration and production projects in 15 countries with details as follows:



Country	Project Name	Participation Interest	Operator
1 Canada	Mariana Oil Sands Project	100%	PTTEP Group
	Brazil BM-ES-23 Project	20%	Petrobras
2 Mexico	Mexico Block 12 (2.4) Project	20%	Petronas
	Mexico Block 29 (2.4) Project	16.67%	Repsol
3 Brazil ¹	Barreirinhas AP1 Project	25%	Shell
	Brazil BM-ES-23 Project	20%	Petrobras
4 Angola	Block 17/06 Project ²	2.5%	TotalEnergies
	Brazil BM-ES-23 Project	20%	Petrobras
5 Algeria	Algeria 433a & 416b Project	35%	Groupement Bir Seba (GBRS)
	Algeria Hassi Bir Rekaiz Project	49%	Groupement Hassi Bir Rekaiz (GHBR)
6 Mozambique	Mozambique Area 1 Project	8.5%	TotalEnergies
	Brazil BM-ES-23 Project	20%	Petrobras
7 United Arab Emirates	Abu Dhabi Offshore 1 Project	30%	Eni
	Abu Dhabi Offshore 2 Project	30%	Eni
8 Oman	Oman Block 61 Project	20%	BP
	Oman Block 6 Project (PDO)	2%	Petroleum Development Oman
9 Kazakhstan	Dunga Project	20%	TotalEnergies
	Abu Dhabi Offshore 3 Project	30%	Eni
10 Myanmar ^{5,6}	Zawtika Project	80%	PTTEP Group
	Yadana Project ⁷	37.1%	PTTEP Group
11 Vietnam	Vietnam 9-2 Project	25%	HV JOC
	Vietnam 16-1 Project	28.5%	HL JOC
12 Thailand	Bongkot Project	66.6667%	PTTEP Group
	S1 Project	100%	PTTEP Group
13 Malaysia	Malaysia Project ^{9,10}	7.2-80%	PTTEP Group
	Vietnam B & 48/95 Project	8.5%	Vietnam Oil and Gas Group
14 Indonesia	Natuna Sea A Project	11.5%	Harbour Energy
	Vietnam 52/97 Project	7%	Vietnam Oil and Gas Group
15 Australia	PTTEP Australasia Project ¹¹	90-100%	PTTEP Group
	Overlapping Area		
13 Malaysia			
14 Indonesia			
15 Australia			

¹ On August 31, 2022, PTTEP Group has entered into a Sale and Purchase Agreement (SPA) to sell PTTEP Brazil Investments in Oil and Gas Exploration and Production Limitada, which holds 25% interest in the Barreirinhas AP1 Project and 20% interest in the Brazil BM-ES-23 Project. The completion will be subject to conditions as prescribed in the SPA.

² On December 16, 2022, PTTEP Group has entered into a Sale and Purchase Agreement (SPA) to sell its entire 2.5% participation interest in Block 17/06 Project.

³ On March 1, 2022, the acquisition of 25% stake in the Sharjah Onshore Area C Project in United Arab Emirates from Eni Sharjah B.V. has been completed.

⁴ On October 26, 2022, PTTEP Group has signed Farm-in/Farm-out Agreement to acquire 25% stake in the Sharjah Onshore Area A Project from Eni Sharjah B.V. The acquisition was completed on December 23, 2022.

⁵ PTTEP Group has notified their decisions to withdraw from Yetagun Project and gas transportation company, Taninthayi Pipeline Company LLC (TPC), to all partners of the project, with effect from May 31, 2022.

⁶ PTTEP Group submitted relinquishment of exploration blocks of Myanmar MD-7 Project after fulfilling the obligations under the Product Sharing Contract. The relinquishment was effective from October 25, 2022.

⁷ On March 14, 2022, PTTEP International Limited (PTTEPI), a wholly-owned subsidiary of PTTEP Group and a partner in the project, has assumed the operatorship of Yadana Project and Moattama Gas Transportation Company (MGTC), with effect from July 20, 2022.

⁸ The concession of Contract 3 Project ended on April 23, 2022, with PTTEP Group's participating interest at 5%. The operator had submitted the block relinquishment. However, all partners in the project remain obliged to decommissioning as prescribed by laws.

⁹ PTTEP Group has named investments of all projects in Malaysia under "Malaysia Project", which comprises several petroleum blocks where PTTEP Group is the operator. The participating interests vary from 42-80%, except for one area named Gumusut-Kakap (GK) in Block K where PTTEP is a joint venture partner with participating interest of 7.2%, and Shell is the operator.

¹⁰ In March 2022, PTTEP Group and SapuraOMV Upstream (Sarawak) Inc. were awarded the exploration Block SB412, which is located offshore northwest of Sabah, Malaysia.

¹¹ PTTEP Australasia Project consists of several concession blocks in Australia, with participating interests of 90-100%. On November 19, 2021, PTTEP Group submitted a request to return the exploration block of AC/L3 and received approval from the Government of Australia on August 2, 2022. PTTEP Group also submitted a request to return the exploration license of AC/P54 on December 19, 2022, and decided not to submit a renewal application of Audacious Field (AC/RL6) on December 20, 2022. All of which will be effective after the Government of Australia's approval.

Drive Value

PTTEP strives to strengthen its petroleum exploration and production business (E&P) and energy security through an increase in production capacity and sales volume of natural gas and crude oil from existing projects. The development of high potential projects are to be accelerated. Additional focus is on the enhancement of cost competitiveness while making safety the top priority. The management of the E&P portfolio is also aimed to make PTTEP a low-carbon organization, with an emphasis on investment in natural gas and liquefied natural gas (LNG). The performance in 2022 is shown below:

Strengthen Energy Security for Thailand

PTTEP commits to operating our business to ensure energy security, address national energy demand and create sustainability in the E&P business. PTTEP has become the operator and safely commenced the petroleum production for G1/61 and G2/61 projects under the Production Sharing Contract (PSC) since April 24, 2022, which helped to

reduce the cost of energy imports. To ensure a smooth and safe transition of the projects, PTTEP worked closely with the Department of Mineral Fuels (DMF) and the former operator. The seamless transition was successfully carried out by the staff with extensive experience and full dedication. Additionally, on July 20, 2022, PTTEP was





appointed as the operator of Yadana Project, to satisfy Myanmar and Thailand’s energy needs and ensure energy security for people in both countries.

Aside, PTTEP has mapped out continuous development plans for existing projects. The production capacity of projects in Thailand and overseas was ramped up,

including Arthit Project and Malaysia-Thailand Joint Development Area Project (MTJDA). PTTEP accelerated the installation of wellhead platforms and subsea pipelines and the drilling of production wells. Production equipment and systems were regularly tested and the maintenance plan was proactively prepared to ensure the readiness and safety of all installations and equipment. The preparations will maintain the business competitiveness as the production cost per unit is controlled amid constant volatility in the industry.



Hit a historical production volume of more than

580,000

barrels of oil equivalent per day and natural gas accounted for

74%



Miss Vanruedee

Chariyapisuthi

Vice President,
Domestic Production Asset
Group Planning Department
PTTEP

“I’m proud to be a part of this Thai-owned company, ensuring the country’s energy security and caring for community development, society and the environment. I do believe that PTTEP’s next moves, no matter what the challenge will prevail, our missions will never change.”

» Exploration Success and Expansion for Sustainability

PTTEP is set to grow its key business, petroleum exploration and production, in 5 strategic countries: 3 countries in Southeast Asia which are Thailand, Malaysia and Myanmar; and 2 countries in the Middle East which are the United Arab Emirates and Oman. The objectives are to ensure energy security in the regions and maintain stability ahead of the energy transition as well as future changes.

PTTEP aims to achieve sustainable growth. In 2022, the Company succeeded in extending the Production Sharing contract (PSC) of Malaysia-Thailand Joint Development Area Project (MTJDA), which effectively allows the continuation of production from 2029 to 2039 which contributes to the future sustainability and security of energy. Regarding the exploration and expansion for sustainable growth, PTTEP, as a joint venture partner, has made a series of achievements in Malaysia and the United Arab Emirates. PTTEP has been awarded the exploration Block SB412 from

the Malaysia Bid Round (MBR) 2021 and ably fulfilled its long-term strategic expansion plan.

PTTEP's other objective is to increase petroleum reserves through investment in strategic prolific petroleum areas like the Middle East. In 2022, PTTEP made a significant gas discovery in the first exploration well of Abu Dhabi Offshore 2 Project in the United Arab Emirates, which is operated by Eni with PTTEP as a partner. The discovery was a major success and a key milestone in propelling PTTEP's business growth. PTTEP and Eni are now evaluating the exploration results before making a decision to accelerate project development. More exploration wells are planned in adjacent areas. The consortium is ready to assemble knowledge, capability and technology to accelerate Abu Dhabi Offshore 2 Project and other exploration projects, to raise the Company's petroleum reserves and production rate.

PTTEP plans to expand investment and collaborate with Eni, in petroleum exploration in new areas. PTTEP has signed



PTTEP signs the production sharing contract for Block SB412 in Malaysia on March 22, 2022

a Farm-in/Farm-out Agreement with Eni for a participating interest in the Sharjah Onshore Area A in Sharjah, the United Arab Emirates, which was completed on December 23, 2022. In addition, the Algeria Hassi Bir Rekaiz Project has successfully commenced its 1st phase of oil production with target production of 13,000 barrels per day. The project will add to total production volume and support the long-term growth of the Company.



Mrs. Supamitra Danpanich

Senior Vice President,
Business Development 1 Division
PTTEP



“Determination, devotion, and collaboration with the partners allows for collaboration of capabilities for technology transfer to deliver us success in exploration and investment in Malaysia and the United Arab Emirates. The success reflects PTTEP’s sustainable growth.”

Supply Chain Management for Sustainability

PTTEP puts an emphasis on efficient supply chain management to prevent and minimize environmental, social and governance risks while creating shared values with suppliers. The Company requires all vendors to sign their acknowledgment of PTTEP Vendor Sustainable Code of Conduct, as well as conducting an annual SSHE Forum among suppliers and the Company to demonstrate a strong commitment to improving Safety, Security, Health and Environment to become a zero incident organization and achieve the Company’s EP Net Zero 2050 target. PTTEP continues to expand the knowledge and understanding of Good Corporate Governance and Business Ethics (CG&BE) to vendors through e-Learning. The key activities in 2022 involve:

Pool Inventory

PTTEP has modified the models or specifications of tools and equipment for petroleum development activity such as drilling pipes, spare parts, etc. to be compatible even in different production fields, so that they could be purchased from the same supplier or in the same area. As a result, we are able to share inventory between production fields, reduce purchasing volume to reserve storage space, and increase the bargaining power from bulk purchasing. This management allows for efficient joint planning and pool inventory between production fields while contributing to warehouse’s electricity consumption reduction. In 2022,

the Company reduced the cost of spare drilling pipes and storage space by up to USD 4.34 million.

Local Content

PTTEP has continuously supported local products and services to promote the local economy. (Local refers to the countries where PTTEP operates.) Particular emphasis is given to local suppliers with the capability of applying various innovations in developing goods and services that meet PTTEP’s standards and requirements. This development process involves information exchange between PTTEP and suppliers as well as recommendations on work process improvement and safety issues. This project creates jobs and generates income for the local suppliers, resulting in PTTEP having a good relationship and gaining acceptance in the countries where PTTEP operates. In 2022, PTTEP supported local businesses in operation areas worth over USD 1,400 million.

Green Procurement

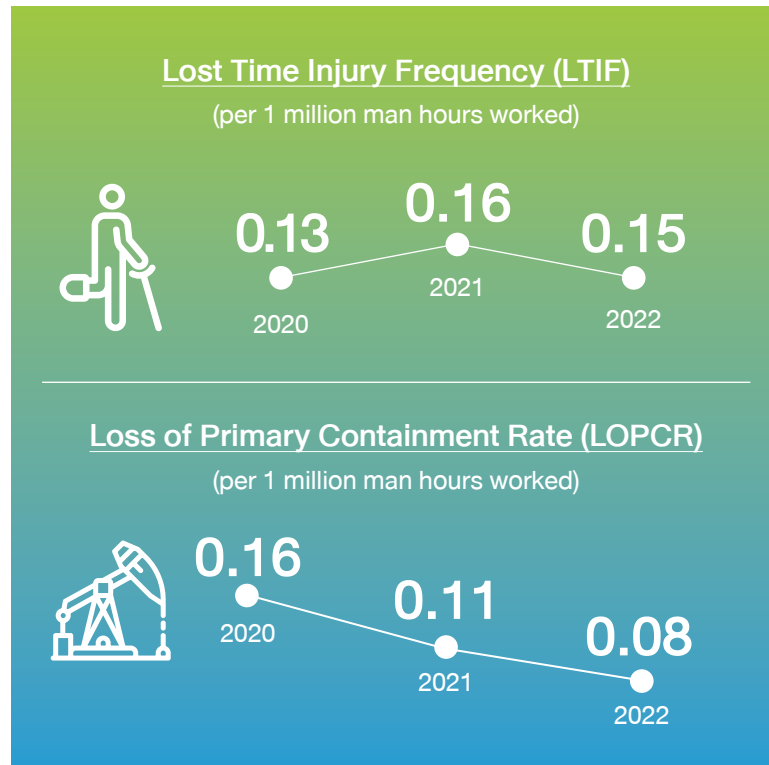
PTTEP has continuously implemented green supply chain management since 2019 with focus on green procurement of products and services while ensuring fuel efficiency and energy saving in transportation to reduce combustion-related greenhouse gas emissions and impacts on global warming. In 2022, PTTEP implemented green supply chain management activities worth approximately USD 566 million.

Journey towards Zero Incident Organization

Throughout the past 37 years, PTTEP has emphasized Safety, Security, Health and Environment (SSHE) and strictly followed the SSHE Management System (SSHE MS) to ensure the awareness of hazards and risks among all employees and contractors. In 2022, PTTEP promoted Human Factor Clinic campaign to prevent human errors that may lead to injury or fatalities through critical barriers and put a spotlight on risk management to prevent leakage-related incident from the exploration and production processes that may lead to Major Accident Event (MAE) in support of PTTEP’s goal to become a zero incident organization. To minimize potential environmental impacts, PTTEP prepared spill response readiness and enhancement through spill capability assessment, agreements with national and international emergency response agencies, equipment preparation, and annual emergency response drills.

As a result of these commitments, the overall SSHE performance statistics in terms of the Lost Time Injury Frequency (LTIF) and the Loss of Primary Containment Rate (LOPCR) show an improving trend. Moreover, they are better than the latest average performance of the industry peers reported to the International Association of Oil & Gas Producers (IOGP).

Realizing the necessity to improve SSHE MS throughout the organization, the Company developed the short-term and



long-term SSHE roadmaps and used them as a guidance for effectively and continuously implementing the SSHE MS, particularly in the area of contractor management, SSHE leadership and commitment to staff and contractors at all levels as well as LOPC prevention program which aims to enhance the Company’s SSHE MS implementation effectiveness to ensure the improvement of our overall SSHE performance statistics.



Mr. Anurak Chantri

Rig Manager
MPC Future Company Limited

“As the representative of MPC Future, I have confidence in all people and believe that safety is not the duty of a single person but the duty of all, at all levels, as career path comes with safety and all life is valuable. It’s why we put an emphasis on safety. ‘I believe in people’”

» Digital Citizen Bootcamp

PTTEP has established the ENTERPRISE Project as part of the transformation journey since 2018, to make digital technology and innovation a key pillar of employee transformation. Up until 2022, PTTEP has launched more than 100 innovation and digital projects which contribute to a cumulative amount of more than USD 500 million in terms of revenue uplift and cost optimization.



PTTEP started building the digital ecosystem to propel a change in perception and the culture that supports the development of broad-based digital innovations through cooperation with Thai digital companies, both start-ups and large-sized private companies, academic institutions such as the Digital Economy Promotion Agency, the National Institute of Development Administration (NIDA), Chulalongkorn University, Thammasat University and Mahidol University, including other multinational companies like Halliburton, KPMG, Microsoft and Google in training programs that deal with real digital innovations. PTTEP realizes that collaboration is an impetus for new ideas and innovations and partnership from all parties (Digital Ecosystem) will induce changes for all and preparedness for PTTEP, other organizations, society and the country.

This initiatives resulted in more than 40 design thinking activities where employees were encouraged to brainstorm and eventually came up with innovative thinking and more than 30 digital projects each year. Most of the projects concern advanced technology like machine learning, artificial intelligence, and smart robots. The Digital Citizen Bootcamp was another initiative organized to groom and increase employees' digital knowledge and skills through various workshops, so that they understand and are prepared for digital technology and innovation. In 2022, approximately 40 innovation and digital projects were developed, and more than 400 employees were transformed into digital citizens. PTTEP's employees would be able to take part in supporting digital technology and innovation development and make contributions to the organization and society.



The highlight project in 2022 was the Pipeline Integrity Management System (PIMS), the system for real-time gas pipeline monitoring and anomaly and risk management to improve safety by reducing the risk of accidents from gas pipelines that could impact both the environment and communities.



Approximately
40 innovation
and digital projects were
developed

More than
400
employees were turned
into digital citizens



Dr. Chavapongsathorn Waisarikarm

Technology Specialist Program Manager
Apple South Asia (Thailand) Company Limited

“Joining this program impressed me and I was excited with the chance to help non-IT personnel develop their skills and build upon their knowledge. I was delighted to see the attention and enthusiasm of all at the workshops. Questions were asked during the training and even after the session was over.”



Diversify

Diversify

Along with business challenges and the energy transition that is transforming the future energy business, PTTEP strives to maintain the momentum of its diversification strategy, to bring about sustainable growth and cope with the changes in the digital era. New businesses are built on PTTEP’s E&P technology and innovation to create added value in non-energy businesses. PTTEP aims to explore investment opportunities for Carbon Capture, Utilization and Storage (CCUS), hydrogen fuel and future energy, as well as expansion in gas-fired and renewable power projects. The performance in 2022 is shown below:

XPlorer V2.0

XPlorer V2.0 is a subsea pipeline inspection class Autonomous Underwater Vehicle (AUV), developed by AI and Robotics Ventures Company Limited, a subsidiary of PTTEP. It possesses a greater and safer inspection capacity when compared to traditional subsea inspection. The XPlorer V2.0 can help reduce inspection costs by 30% for target customers and business partners that demand regular inspection of subsea petroleum pipelines.





Smart Forest Solution

Powered by long-range surveillance technology, Smart Forest Solution enables the survey of more than 100-rai areas in a day, instead of more than a week. The Smart Forest Solution integrates technologies for green area management and rehabilitation planning that involve a satellite system, multi-spectrum drone pictures and AI data analysis via “Varuna Analytics” platform. The solution enables the monitoring and management of large green areas, the initial carbon credit monitoring and calculation of a large area to detect risks of possible wildfires.

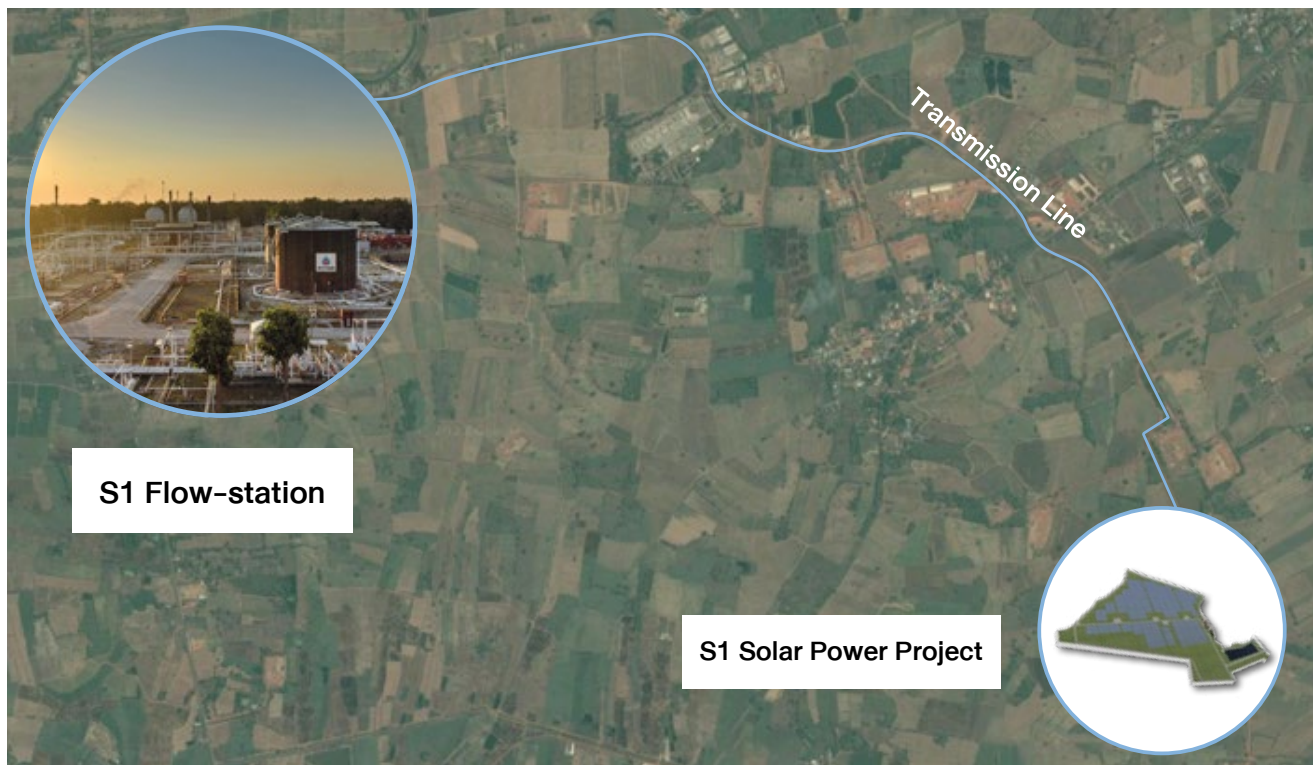


Mr. Attaya Phinjongsakuldit

Director, Information and Communication Technology Center
Land Development Department,
Ministry of Agriculture and Cooperatives

“Smart Forest Solution offers multi-dimensional benefits to green area development and serves as the database for green area development. This technology helps the government sector as well as relevant parties to utilize the data for their efficient planning, measuring and further developing such as the CO₂ storage calculation model for a planned in-depth environmental study at Khung Bang Kachao.”

S1 Solar Power



Map of the Solar Farm Project

S1 Solar Power Project was initiated in 2022 with the objective to replace natural gas with solar power for electricity generation in the petroleum production process at the Sirikit Oil Field. The project has an electrical capacity of 10 MW, aiming to replace electricity generated by the gas turbine generators at approximately 9% of the electricity demand in the Sirikit Oil Field.

Through the S1 Solar Power Project, the Company will be able to reduce natural gas consumption for electricity generation and prolong production at the Sirikit Oil

Field at approximately 0.4 million cubic feet per day, a preliminary evaluation of the reduction of cumulative GHG emissions assessed that it was equal to 94,000 tonnes of CO₂ equivalent throughout the concession period.

S1 Solar Power Project is being developed and implemented by FutureTech Solar (Thailand) Company Limited, a subsidiary of PTTEP. The construction is underway with the expected Commercial Operation Date (COD) for sale to the Sirikit Oil Field in the 2nd quarter of 2023.

S1 Solar Power Project supports the reduction of GHG emissions by

94,000 tonnes of CO₂ equivalent throughout the concession period



equivalent to tree plantation* on **98,000** -rai areas

*Calculated from local slow-growing plants as appeared in TGO's plant capacity manual (June 2011)

» Exploring Opportunity for Pilot Plant of Green E-Methanol

In response to energy transition, PTTEP has joined 5 multinational companies – Air Liquide, YTL PowerSeraya Pte. Limited, Oiltanking Asia Pacific Pte. Ltd., Kenoil Marine Services Pte Ltd, and A.P. Moller - Maersk A/S – to explore the feasibility of green e-methanol production. Under the collaboration, technology will be deployed to produce green e-methanol from CO₂ obtained as a byproduct during the industrial manufacturing process, which is otherwise emitted to the atmosphere and use of green hydrogen which is produced from renewable energy. Green e-methanol is low-carbon fuel for the maritime industry. The alternative fuel will help shipping companies reduce their CO₂ emissions and meet the International Maritime Organization (IMO)’s 2030 and 2050 emission goals.



lead to investment in the construction of a pilot plant, which will play a vital role in supporting other industrial sectors’ emission reduction. The pilot plant is planned with a minimum capacity of 50,000 tonnes per annum and will be built in Singapore as the first green e-methanol plant in Southeast Asia.

In 2022, the 6 companies have conducted feasibility studies on technical and economic aspects of the green e-methanol pilot plant, expecting to complete the tasks in 2023. If the results of the study are successful, it will

» CCS as a Service



Apart from driving forward the Carbon Capture and Storage (CCS) Project as a key technology to reduce GHG emissions from PTTEP’s operations, PTTEP has conducted a feasibility study to also implement CCS in other areas in Thailand to support the reduction of CO₂ emissions from other industries in the future.

define CCS opportunities to reduce CO₂ emissions from industrial and energy sectors in the Eastern Economic Corridor (EEC).

In 2022, PTTEP and PTT Group initiated the Eastern Thailand CCS Hub Project with the aim to

This project aims to capture the emitted CO₂ and transport it to the offshore underground storage site in the upper part of the Gulf of Thailand and will contribute to the economic value and reduce technical risks, in accordance with the international CCS project guideline.

» Pipeline Decontamination Technology Development



PTTEP has developed the world's first-ever pipeline decontaminating and sample-collecting technology, to avoid environmental impacts from the decommissioning of gas pipelines in the Gulf of Thailand. The development process started in 2015 in collaboration with academic institutes and research centers as well as environmental experts and the progress has been regularly reported to the Department of Mineral Fuels. Becoming the world's first decontamination solution named MERClean and sample-collecting equipment named MERIns which were tested on 3 pipelines of the North Bongkot Project in March 2022. After decontamination, the remaining contaminants in the pipelines were measured. The result was very satisfactory as contaminants decreased by more than 90%.



As a step forward, PTTEP plans to further improve this innovation mostly by enhancing the efficiency of the sample-collecting tool with artificial intelligence for a more accurate volume of samples. We also plan to promote this innovation on a global stage to ensure that this environmentally-friendly pipeline decommissioning method is internationally accepted. In addition, the Company aims to drive innovations to expand into a commercial business that can generate revenue in the future.



Mr. Phanuwat Jitputti

Manager,
Production Operations Support 2 Section
PTTEP

"MERIns is innovative equipment PTTEP intended to develop for decommissioning. Thus, we take great pride in this innovation. With this single equipment, we can decontaminate pipelines, precisely check contaminants and collect samples without causing environmental impacts. MERIns is considered another milestone of PTTEP. We can develop equipment that efficiently and effectively improves the decommissioning of equipment and pipelines in the Gulf of Thailand."



Deepen and Broaden Sustainability

Deepen and Broaden Sustainability

Throughout the years, PTTEP has adhered to sustainability principles in ensuring energy security in support of economic and social development and respecting the environment, no matter where we operate. As PTTEP is an organization which operates mostly offshore, we have laid out approaches for sustainable marine natural resource and ecosystem conservation and rehabilitation under the “Ocean for Life” Strategy which aims to create sustainable value for all stakeholders as our vision of “Energy Partner of Choice”. To build the foundations for sustainable growth, PTTEP gives great importance to workforce capability development as employees are an essential resource and a key driver for the organization to achieve sustainable resilience. Meanwhile, we uphold governance and maintain appropriate risk management as well as internal control and strictly comply with relevant laws and regulations, under Governance, Risk Management and Compliance (GRC) which encompass human rights commitment.



Aside, PTTEP is moving forward with technology and innovation development, a major factor to enhance business efficiency, competitiveness and resilience.

PTTEP has implemented several projects that target creating sustainable values for stakeholders. The performance in 2022 is shown below:

» GRC for Sustainability

PTTEP aspires to achieve transparency and efficiency in our operations, for stability and sustainability. We have adhered to good corporate governance and business ethics (CG&BE), risk management and appropriate internal



control (Governance, Risk Management and Compliance – GRC), aside from strict compliance with relevant laws and regulations. Key actions in this regard are as follows:

- Initiated the Chatbot risk management system to cover risk suggestions and a complete archive of risk data, in support of the management of risks that may impact the organization’s targets.
- Continuously improve the GRC One Digital System which pools reports relating to complaints received, risk management, business continuity management, internal control assessment and compliance, to support when making major decisions.

- Constantly strengthen GRC culture via communications and activities, primarily to boost employees' understanding of GRC principles and the organization's tools that include GRC Strategy and Roadmap, GRC Targets, GRC Management System and GRC Lesson Learnt communication tool, for adaptation of GRC in their work and advocate GRC best practices to the society at large through, for example, Explorer's Journal and Facebook: PTTEP Shareholders Society.
- Manage the personal data of employees and non-employees in line with legal requirements and update the internal work process to align with the Personal Data Protection Act B.E.2562. The task involves the preparation of the Personal Data Protection Policy and the Privacy Notice on the Protection of Personal Data. Aside, there is a channel whereby data owners can file requests for their rights on data appearing on the Company's website and ask for consent and receive other notifications as required by law.



In 2022, PTTEP received the fourth NACC Integrity Awards from the National Anti-Corruption Commission. The award is presented to organizations that demonstrate operational transparency and international ethical standards. In the year, Malaysia Asset was certified with the ISO 22301 international standard for its Business Continuity Management (BCM) system. Reflecting PTTEP's determination to align its operations with strong GRC, to pave the way to sustainable path towards its goals.

100%
of employee completed
CG&BE e-Learning

Maintain
100%
CG&BE acknowledgment
by employee



**Mr. Md Ezamudin
Mohd Said**

Head of Malaysia Production
Operations Department
Malaysia Project
PTTEP

“GRC has been systematically embedded in the Company and helps strengthen the objectives ensuring compliance to regulations, safety rules, and conduct risk management as low as reasonably practicable. GRC is always the way of working in the Malaysia Asset.”

Human Rights

To prevent human rights violations from the Company's business activities, PTTEP emphasizes all dimensions of human rights management to cover employees, suppliers, contractors, and communities around PTTEP's operational sites across the world where different human rights risks may arise. The management entails workplace, safety, security, health and environment, supply chain and communities including vulnerable groups. In addition, suppliers, contractors and business partners are encouraged to share the same human rights principles. It's our belief that a key success factor to drive the organization towards sustainability is to responsibly operate our business to create shared values for all stakeholders under an effective human rights management system.

PTTEP is determined to establish a foundation for fair and equitable human resource management. The policy and guidelines are in place to stress our respect and promotion of diversity in terms of language, race, religion, belief, social status, sexual orientation, age and disability. In addition to the Human Rights Policy in Thai and English, in 2022, PTTEP had the policy translated into 4 more languages – Malay, Myanmar, Arabic and French – to ensure a better understanding among local employees in overseas assets. The Company also carried out activities to promote diversity including communication on gender diversity and

Trust & Respect, one of the *EP SPIRIT* corporate values, in hopes that all employees would live together happily despite the differences and consequently drive the organization towards sustainability under One Team, One Goal spirit.

A consequence of our determination to promote diversity, PTTEP's ratios of female executives and employees are 28% and 33% respectively, rising above the oil and gas industry's average. Moreover, the Company has continuously promoted opportunity equity for local and foreign employees in terms of capability building and career advancement to executive level. Since 2021, PTTEP has recruited new graduates through the Restart Thailand Program with the aim to promote an equitable career opportunity through experience enhancement and skill training. Through the program, the recruited graduates are expected to build a career and earn a living, which will enhance Thailand's economic growth and Thai people's quality of life. In 2022, there was 329 jobs created in total.

In the annual human rights risk assessment for 2022, PTTEP identified risks from Yadana and Zawtika projects following the coup in the Republic of the Union of Myanmar. The risks primarily concerned the safety of employees and contractors at the operational sites as well as the operation's integrity which could impact energy security. Currently, both



projects supply natural gas for the generating of electricity, which is a basic necessity for improving people's standard of living, driving economic growth and developing the country. Besides, equitable access to energy is a fundamental human right that all people in every country are entitled to. Currently, the Company has been closely monitoring the situation with a primary concern on the employees' safety and the Republic of the Union of Myanmar's energy security. Under these challenging circumstances, the Company has followed the crisis management and business continuity plans to minimize negative impacts in hopes that the situation will improve soon. PTTEP will avoid involvement in any form of human rights violation from the Company's business activities and remain political neutral while honoring the cultures, traditions, values and applicable laws of all countries where we operate, including the Republic of the Union of Myanmar.



Ratio of female executives

25%*

Ratio of female employees

32%*

*Above the oil and gas industry's average, reference from Driving Gender Balance in Oil & Gas, BCG, 2021

A number of **329** jobs
have been created
under Restart Thailand Project



Miss Su Myat Kalayar Soe

Manager,
Sales Commercial Section
Myanmar Project
PTTEP

"I received a great opportunity to strengthen my commercial knowledge through an Individual Development Program at PTTEP Head Office in Bangkok. Through this program, I gained more confidence and was fully prepared to manage Zawtika Sales Commercial Section today. To me, PTTEP is a workplace with the best opportunity for individuals who seek long-term career growth and treats employees like family. It's been my pride to work with PTTEP in supporting energy security for both Myanmar and Thailand."



Mrs. Khin Min Min Aye

Manager,
Administration Section
Myanmar Project
PTTEP

"As part of my capability development, I have learned new things, gained international exposure and got in-depth knowledge of the Company's vision, mission, goals and corporate culture through various activities, workshops and seminars – all of which add value to my competency. In my perspective, all employees are given an equal opportunity for career enhancement. I'm honored to be a member of PTTEP family consistently pursuing our commitment to the sustainability of global energy security and supply."

People Readiness to Support Energy Transition



Preparing the workforce for the energy transition is the primary goal of PTTEP's human resource management. Our people need the skills, knowledge and competencies necessary for their adjustment to the waves of changes; and can perform their tasks efficiently and happily.

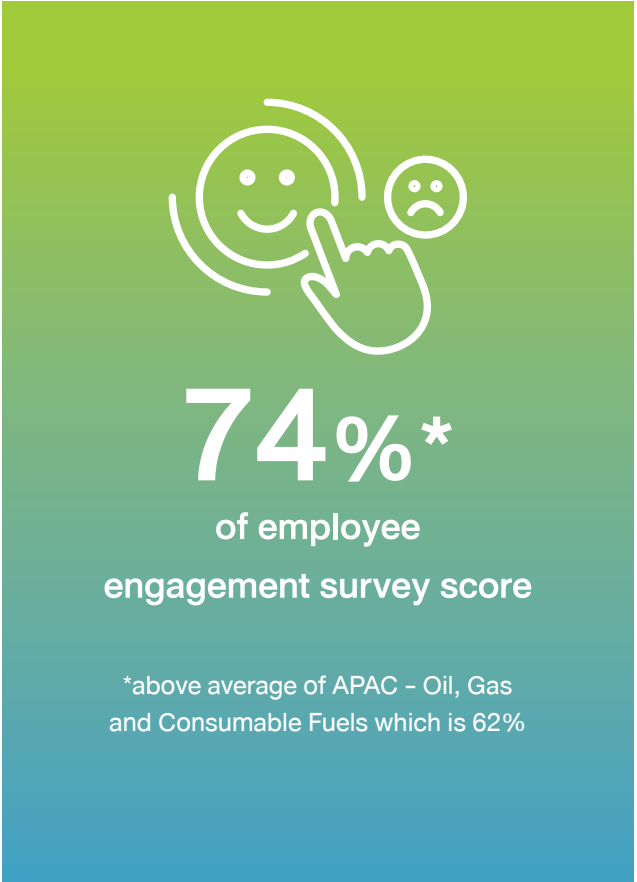
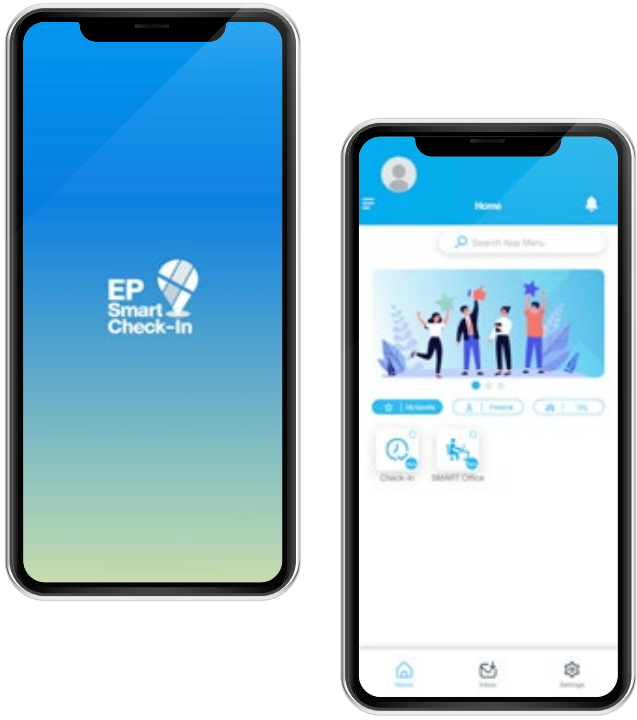
In support of business strategies, PTTEP has undertaken the reorganization process with the priority given to the preparation of success profiles and succession planning for E&P business, high value projects and beyond E&P business; and capability enhancement for employees concerning future skill sets, digital technology, soft skills and mindset. This is to prepare employees for the transition and transfers from E&P business to beyond E&P business.

PTTEP's workforce capability building continued in 2022, through assignments, coaching and classroom training according to individual development plans.

Employees are encouraged to take online learning courses on various platforms like i-Learn, SkillLane, BrighterBee, IHRDC and TikTok so that all generations can learn from anywhere, anytime in line with the Hybrid Workplace model.

Digital technologies have been deployed to promote employees' learning. Aside, digital solutions are used in enhancing the efficiency of work process. Among them are: internally-developed Your PA application (People Advisor – PA) that allows supervisors from manager level to access the summarized data of their subordinates and use the data in planning assignments, development plans and preliminary career advice; and DAS Digitalization that gathers employees' pain points during their searches for data concerning Delegation, Authority and Signatory (DAS). The DAS Digitalization solution is web-based, accessible to all employees and ready as accurate and speedy references in the Company's approval forms.

As the COVID-19 outbreak eases, PTTEP has launched the Hybrid Workforce model to facilitate employees. The model shows a mix of work from the office and work from anywhere. With EP Smart Check-in mobile phone application, when in the office, employees can check in and select the place to work in line with their assignment on a particular day. When working from anywhere, they can also check in with this application. This will let their supervisors know where they are so that, in case of any emergency or unsafe conditions, their supervisors can provide prompt assistance. Moreover, the Company has prepared workplace equipment and facilitated the connection from Headquarters or other places, to ensure flexibility and enable employees to improve their work-life balance.



Miss Theint Htoo Ngon

Officer, HR Operations
Myanmar Project
PTTEP

“DAS Digitalization is one of the useful functions that has been added as part of HR consulting and policy of organization updates on the website where we can get access and refer to the proper procedures of getting approvals. The core benefits of using digital DAS help us identify appropriate approval authority and authorized signature levels with step-by-step approval processes in compliance and aligned with corporate directions.”

Technology and Innovation

PTTEP has carried out technology and innovation research and development to lead the Company towards sustainability amid business challenges and energy transition while also creating sustainable values for all stakeholders. PTTEP has collaborated with domestic and international partners including companies within PTT Group, government agencies, private companies, academics and research institutions with 3 main objectives:

1. To drive value and enhance competitiveness in E&P business
2. To reduce greenhouse gas emissions to become a low-carbon organization
3. To support energy transition and new businesses.

The performance in 2022 is shown below:



Mr. Supot Lertsakulsup

Vice President,
Thai Offshore Production Operations 2 Department
PTTEP

“The in-house technology and innovation development enhances efficiency and quickly addresses production issues. Applying technology in work and production processes also helps reduce greenhouse gas emissions and will enable the Company to accomplish the EP Net Zero 2050 target. Besides, it plays a part in enhancing the workforce’s capabilities and the Company’s competitiveness.”

CO₂ Conversion to Cyclic Carbonate

Carbon Capture and Utilization (CCU) is a pivotal process to reduce GHG emissions these days. It is applicable to both energy sector and other manufacturing sectors. The process involves the capturing of carbon dioxide before it is released into the atmosphere and conversion to valuable and usable products. Besides reducing GHG, the process can also be developed into new businesses.

To develop efficient CCU technology, PTTEP has collaborated with Vidyasirimedhi Institute of Science and Technology (VISTEC) to research and develop catalysts and a process for “CO₂ Conversion to Cyclic Carbonate” (CCC). Cyclic carbonate is considered as a high market value and is usable as electrolytes for lithium batteries, solvents for paint and coating industry, and the synthesis of green polymer. The prototype production unit is being constructed and the testing is scheduled for completion in mid 2023.



The CCC technique will reduce CO₂ emissions by converting CO₂ to highly-demanded cyclic carbonate, which is kept in a liquid form for convenient storage and transportation. It is estimated that 200,000 tonnes of cyclic carbonate production can help in the reduction of 100,000 tonnes of CO₂ equivalent per annum, equivalent to the growing of trees in a 105,000-rai area.



CCC at 200,000 tonnes production
can reduce CO₂ **100,000** tonnes of CO₂ equivalent per annum
or equivalent to the growing of trees in **105,000**-rai areas.*

*Calculated from local slow-growing plants as appeared in TGO's plant capacity manual (June 2011)



Assistant Professor Valerio D'Elia, Ph.D.

Faculty Member,
School of Molecular Science and Engineering (MSE)
VISTEC

“My commitment is to contribute to the reduction of greenhouse gas emissions. I believe that besides a strong increase in energy efficiency, more rational management of emissions is required to mitigate our net carbon footprint. By coupling CO₂ and petrochemicals, we can achieve value-added products that support emerging industrial applications and create jobs. In the current project, I collaborate with PTTEP to develop catalytic systems that directly convert waste CO₂ and highly available epoxides to industrially attractive cyclic carbonates that serve as components of lithium batteries, solvents, and intermediates for the preparation of more sustainable polymers. The developed process is a crucial leap forward for a sustainable CO₂-driven economy.”

» Curing Technology for CO₂ Sequestration in Artificial Reefs

Curing technology for carbon sequestration in artificial reefs is a sustainable technology that chemically converts CO₂ into calcium carbonate (CaCO₃), or limestone embedded in concrete material, producing harder artificial reef concrete. This technology is one of the key initiatives that could lower greenhouse gas emissions to the atmosphere, reducing GHG that causes global warming and climate change issues.

PTTEP in collaboration with Chulalongkorn University initiated a study on the production of concrete materials for an artificial reef through the utilization of CO₂ in concrete curing. The product helps to return abundance to the oceans, along with the sustainable conservation of the coral reef ecosystem. The technology will add strength to artificial reef concrete by curing it with CO₂, non-toxicity to the environment. After testing, the artificial reefs produced under this technique meet prescribed industrial standards.

The CO₂ sequestration in reefs will reduce CO₂ emissions by converting CO₂ to calcium carbonate (CaCO₃) embedded in concrete material. It is estimated that 10,000 pieces of concrete artificial reefs will be utilized by related organizations annually. The emission reduction



capacity can be boosted from 2,800 to 8,400 tonnes of CO₂ equivalent per year by increasing the utilization in Thailand and countries in Southeast Asia to 100,000-300,000 pieces, which is equivalent to the growing of trees in a 2,900-8,800-rai area



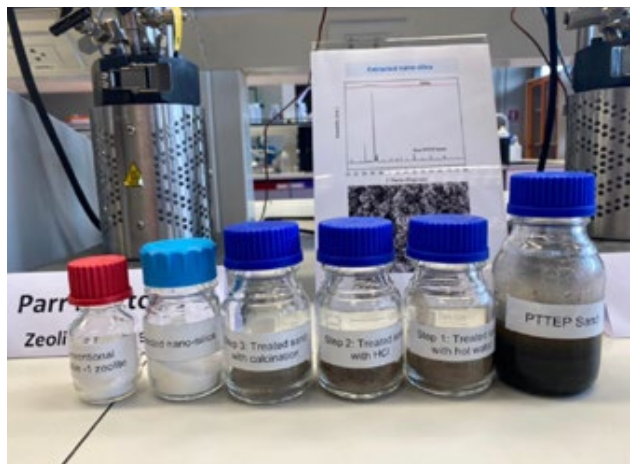
Assistant Professor Vorapot Kanokkantapong, Ph.D.

Director of Interdisciplinary program in Environmental Science and assistant professor of Environmental Science, Department of Science, Chulalongkorn University

“Applying CO₂ storage in artificial reefs is a viable and environmentally-friendly means. It helps address the GHG reduction and supports Thailand’s commitment to achieving net zero emission. The curing and reef-molding technology with CO₂ allows artificial reefs to withstand more compression pressure compared to reefs made from conventional materials. The bigger habitat from durable reefs will welcome more marine life and hence return the abundance to the ecosystem. Artificial reefs can be a selling point in terms of environmental conservation, along with the conservation and restoration of natural reefs. This can benefit tourism and coastal community economy.”

» Sand to Zeolite

Under the Circular Model for E&P Strategy, PTTEP has redesigned work processes to increase reuse and recycling of resources with proper, safe and efficient conditions. That is executed along with a sustainable approach for waste management. Each year, the production at Zawtika Project produced a large volume of sand which required a huge sum to manage. PTTEP thus initiated the sand to zeolite initiative, to turn Zawtika Project's sand waste into zeolite with innovative technology and innovation that support the circular economy concept. Valuable zeolite is suitable for a variety of applications, such as adsorbent, catalyst and energy storage. Its adsorption quality encouraged PTTEP to use zeolite in adsorbing moisture associated with the production process at gas fields. The laboratory prototype successfully synthesizes zeolite that is of higher value at a lower price. PTTEP will pursue more studies in this regard.



Clearly, Sand to Zeolite Project can help in the reduction of petroleum-production waste. Moreover, it is a sustainable waste management approach to turn sand into valuable substance that benefits PTTEP and others.



Mr. Norapon Tangtrongchitt

Vice President,
Myanmar Production and Operation Support Department
Myanmar Project
PTTEP

“Extracting natural gas from Zawtika Project leaves us a large volume of sand. It keeps flowing out and needs treatment prior to going to the landfill. The Sand to Zeolite Project aims to make zeolite from sand waste from Zawtika Project and demonstrates PTTEP’s determination to achieve Zero Waste to Landfill Target in 2030 and the intention to harness upcycling technologies as guided by the circular economy concept.”

» Ocean for Life

PTTEP's operations are mostly carried out offshore. Oceans are thus our second home that should be safeguarded. PTTEP has initiated the "Ocean for Life" Strategy as a way to conserve and rehabilitate marine resources and marine ecosystem in a sustainable manner through the implementation plan in 3 workstreams: Clean & Friendly Operation, Ocean Health & Biodiversity Monitoring and Ramp up CSR around Ocean.

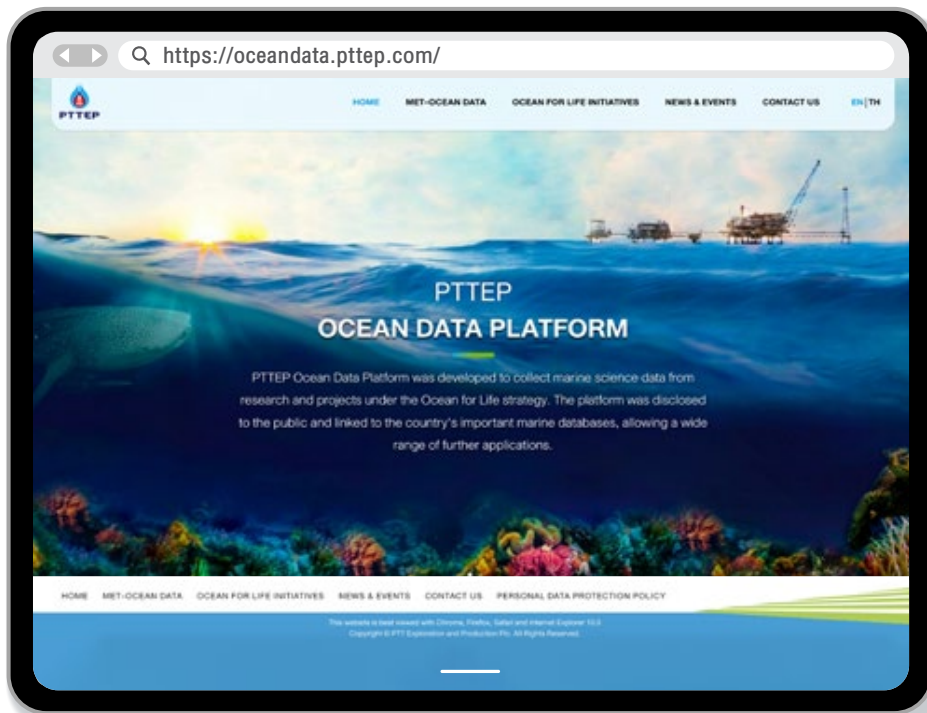
To substantialize the strategy, PTTEP deploys its knowledge and expertise on offshore operations and advanced technology. With the knowledge and expertise, PTTEP initiated a number of projects to reach the 2030 targets in achieving a net positive impact on ocean biodiversity & ecosystem services (BES) value, increasing of incomes of focused communities, and offsetting GHG emissions on a path towards Net Zero GHG emissions in 2050.

» Development of Ocean Current Mapping through the Use of Current Mapper Buoys and Satellite Tracking Technology

PTTEP collaborated with the Hydro-Informatics Institute (Public Organization) and Kasetsart University's Faculty of Fisheries to study seasonal ocean current patterns in the Gulf of Thailand through the use of current mapper buoys and satellite tracking technology. The current mapper buoys are deployed on a monthly basis during Q2-2022 to Q2-2023 from Arthit Project, an offshore petroleum field in the Gulf of Thailand. The project marks the first in Thailand to deploy current mapper buoys from an offshore petroleum platform. Results of the study shall be used as the key inputs for various ocean conservation and emergency plans, early warning systems as well as the enhancement of ocean mathematical models such as marine debris dispersion prediction, climate change impact monitoring, potential impact on ecosystem and its human use prediction, etc.



PTTEP Ocean Data Platform



In 2022, PTTEP developed the PTTEP Ocean Data Platform, which combines the results from all studies undertaken under the Ocean for Life Strategy. The platform includes meteorological and oceanographic data, as well as the results and summaries of PTTEP ocean activities to increase biodiversity and the quality of life of the coastal communities, etc. PTTEP strives to expand the project to

cover all offshore areas in Thailand and as many overseas as possible, to disclose to the public and link to the country's important marine platforms, allowing a wide range of further applications and supporting data utilization that will lead to the conservation and rehabilitation of marine resources and marine ecosystems in a sustainable manner, as well as supporting Thailand's Ocean Health Index (OHI) target.

Thailand's first attempt in using an offshore petroleum platform as a station to collect scientific and ocean health data



**Assistant Professor
Thorn Thamrongnavasawat, Ph.D.**

Associate Dean for Special Affairs
Faculty of Fisheries
Kasetsart University

“PTTEP has supported the ‘Ocean Current Mapper’ Project by deploying buoys from its offshore petroleum platform. This marks Thailand's first study of ocean currents and oceanographic data from offshore and it will allow us to learn more about ocean currents, seawater surface temperature and oceanographic data in the area linked with the South China Sea. In addition, the collected data can be utilized in various cases. For example, we can trace the direction of ocean currents in support of the search for missing persons from maritime accidents. We can also study the migration of marine lives in different seasons, as well as the currents that may impact the ecosystem. The data from this project will be integrated into PTTEP Ocean Data Platform, a scientific marine data hub that is accessible to all with the aim to drive ocean sustainability as envisaged by the Ocean for Life Strategy.”

PTTEP Teenergy



PTTEP launched PTTEP Teenergy Project in 2014 to establish a youth network and extend opportunities to young innovators who will play an important role in giving back to society and the environment. Six annual events during the year 2014-2019 have so far selected 880 high-school students from 350 schools across the country for natural resource and environment conservation camps and these students have initiated over 100 projects in their communities.

In 2022, the 8th PTTEP Teenergy was organized in accordance with the PTTEP “Ocean for Life” strategy. Participants were selected through the PTTEP Teenergy: The 2nd Young Ocean for Life Innovation Challenge that offered prizes worth THB 900,000. There were 300

students from 27 educational institutions who submitted 79 entries under the Protect/ Preserve/ Provide categories. To give the youth a chance to build their prototypes, PTTEP extended support to 3 innovation projects: (1) Smart litter-trap buoy from Rajamangala University of Technology Srivijaya which is installed at the mouth of canal to block garbage from flowing to the sea while allowing through passage for boats, (2) Seagrass bed recolonization box for coastal restoration and carbon sequestration from Mahidol University and (3) Fisherman’s Friend from Kasetsart University. PTTEP plans to conduct further research and development on selected prototypes so that the innovations can be actually utilized in a collaborative and concrete manner to preserve Thailand’s ocean.



Miss Narisara Thongsuksaeng

The Golden Mermaid Team, Rajamangala University of Technology Srivijaya, first prize winner in Protect Category and the prize for the implementation of its innovative smart litter-trap buoy installed at the mouth of canal to block garbage from flowing to the sea while allowing through passage for boats.

“We have placed the buoy in Balasoh Kaosaen community in Bor Yang Subdistrict, Songkhla Province, to solve waste issues and improve the quality of life for people living there and those who depend on marine resources. We received enormous knowledge and experience and also received new perspectives on ocean waste. We exchanged knowledge on innovation with students from other universities and importantly, we’re proud that our innovation is actually utilized and working. Thank you, PTTEP, for the opportunity to present new ideas that may be the beginning of the concrete conservation of marine resources.”

» Aquatic Animal Hatchery Learning Center and Coastal Conservation Area and Fish Home Projects

The Gulf of Thailand offers valuable resources particularly marine animals that create economic value for the tourism industry, fishermen and the country. However, the exploitation of resources has meant direct and indirect impacts on the abundance of marine resources and coastal communities.

Driven by our determination to help restore the abundance, PTTEP has launched conservation projects under the “Ocean for Life” strategy. In collaboration with authorities and coastal communities that rely on marine resources, PTTEP has set up the Aquatic Animal Hatchery Learning Center and the Coastal Conservation Area and Fish Home Project in the coastal areas of 17 provinces. PTTEP has established a conservation network and learning centers that breed aquatic animals and share knowledge to local fishermen, to make broad-based changes starting from community level. With support from PTTEP, 10 learning centers have been established in 8 provinces and 3 more will be built in 2023. More than 14 billion marine animals have been released into the sea (accumulative since 2019). To provide natural sanctuary for baby marine animals, PTTEP has worked with the Department of Marine



and Coastal Resources, Department of Fisheries, local authorities, relevant offices and a network of fishermen to build a coastal conservation zone that covers 0.5 square kilometers in each network area. It is 500 meters from the coastline and spans about 1 kilometer along the coastline. The zone is marked by the placement of fish homes that are made from natural and locally-sourced materials like coconut-palm leaf stalks.

In 2022, PTTEP placed 25 fish homes covering 12.8 square kilometers of coastal conservation areas. The task is to carry on establishing 31 conservation boundaries to cover more than 15.5 square kilometers in 17 coastal provinces around the Gulf of Thailand.

 <p>Established 10 Aquatic Animal Hatchery Learning Centers in 8 provinces</p>	 <p>12.8 square kilometers of coastal conservation area from 25 fish homes</p>
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Mr. Sulaiman Darao

Head of Panare Subdistrict Local Fishery Club,
Pattani Province

“Panare Subdistrict Local Fishery Club has been supported by PTTEP and the Department of Marine and Coastal Resources (DMCR) since 2016. They supported the establishment of a crab bank, an exhibition zone for a learning center, as well as a fish home and a coastal conservation area where fishing is totally prohibited. Our agreement is that crabs caught by fishermen will be handed over for hatchery and baby crabs will then be released to the sea. Fisherman’s monthly income per boat increased by THB 3,000 on average. More than 1,695 million crabs have been released. We have welcomed more than 13,000 visitors and continually launched conservation activities. Thank you, PTTEP and DMCR, for the support to the crab bank and help in making the fisherman’s learning center on sustainable crab fishery.”

Awards and Recognitions



Sustainability



Being rated AA Level (ESG Leader)
in the integrated oil and gas sector

Morgan Stanley Capital International (MSCI)
ESG Research



Silver Class, S&P Global Sustainability Awards
in The Sustainability Yearbook 2022

S&P Global

Sustainability Award
Silver Class 2022

S&P Global



2023 ESG Industry Top Rated Company
Sustainalytics



Sustainability Awards of Honor,
due to having received Best Sustainability Awards
for the 3rd consecutive year

**SET Awards 2022 by the Stock Exchange of
Thailand (SET) and Money & Banking Magazine**



Member of the FTSE4Good Index Series
for the 7th consecutive year

FTSE Russell



FTSE4Good



2022 Thailand Sustainability Investment (THSI)
for the 7th time

The Stock Exchange of Thailand (SET)



HPO High Performance Organization



★ APAC NOC of the Year 2022 Award
**Asia Pacific Energy Capital Assembly
by Energy Council**

★ Asia's Best CEO for the 5th consecutive year,
Asia's Best CFO for the 9th consecutive year,
Best Investor Relations Company (Thailand) for the
10th consecutive year, and Best Investor Relations
Professional for the 2nd consecutive year
**The 12th Asian Excellence Awards 2022
by Corporate Governance Asia Magazine**

★ Best Overall Investor Relations (Large Cap),
Best Investor Relations Officer (Large Cap),
and Best in Energy Sector
**IR Magazine Awards - South East Asia 2022
by IR Magazine**

★ Best HR Strategy in line with Business Award
and Managing Health at Work Award
**Thailand Best Employer Brand Awards 2023
by World HRD Congress and CHRO Asia**



★ Bronze Award in the category of Succession Planning
Strategy
**Employee Experience Awards 2022,
Singapore Human Resources Online**



★ Asian Experience Awards 2022 in the category of
Thailand Brand Experience of the Year – Oil & Gas
award
Asian Business Review Magazine

★ Most Outstanding Winners of Global Most
Innovative Knowledge Enterprise Award 2022
(Global MIKE Award 2022) and Southeast Asia
Most Innovative Knowledge Enterprise Award 2022
(SEA MIKE Award 2022) in Gold Level 2
for the 2nd consecutive year
**Institute for Knowledge and Innovation
Southeast Asia (IKI-SEA)**



★ Management Level (B-List) in Climate Change
Management and Water Management
CDP



★ Best Investor Relations Awards for the 2nd consecutive
year and Best Innovative Company Awards for
Intelligence Pipeline Internal Sampling PIG technology
**SET Awards 2022 by the Stock Exchange of Thailand
(SET) and Money & Banking Magazine**

★ Outstanding Award in Low Carbon and Sustainable
Business (LCSB) 2022
**Thailand Greenhouse Gas Management
Organization (Public Organization)**

GRC Governance, Risk Management and Compliance



Member of Thai Private Sector Collective Action Against Corruption (CAC) for the 3rd consecutive year
Thai Private Sector Collective Action Against Corruption (CAC)

Being rated "Excellent" and receiving 5 symbols of the National Corporate Governance Committee's, the highest level, based on the Corporate Governance Report of Thai Listed Companies (CGR) 2022
Thai Institute of Directors Association (IOD)

ASEAN Top 20 PLCs and ASEAN Asset Class PLCs resulting from the 2021 ASEAN CG Scorecard
ASEAN Capital Markets Forum (ACMF) and Asian Development Bank (ADB)



2022 Role Model Organization on Human Rights in State Enterprise Sector for the 4th consecutive year
Rights and Liberties Protection Department, Ministry of Justice

SVC Sustainable Value Creation



CSR World Leader in 2022 Award
**The Green Apple Environment Awards by
 The Green Organization**



Best Community Development Award in Gold Level
 for H.T.M.S. Underwater Learning Sites Project
International CSR Excellence Awards



Best Community Development Award in Gold Level
 for Community Health Development Programs
Gulf Sustainability Awards 2022



Golden Peacock Global Award for Corporate Social
 Responsibility for the 3rd consecutive year
The Institute of Directors (IOD), India



Asia's Best CSR for the 3rd consecutive year
**The 12th Asian Excellence Awards 2022
 by Corporate Governance Asia Magazine**



Best Corporate Social Responsibility Practice Award
 for Skill Development Project
Asia's Best CSR Practices Awards



Best Country Award for the Overall CSR Excellence
 in Thailand
 and Best Environmental Excellence Award for PTTEP
 Reforestation Project
**The 14th Annual Global CSR Virtual Summit and
 Awards 2022**



Global CSR Excellence & Leadership Awards in the
 category of Concern of Health for Stunting Prevention
 Program in Indonesia
11th World CSR Congress

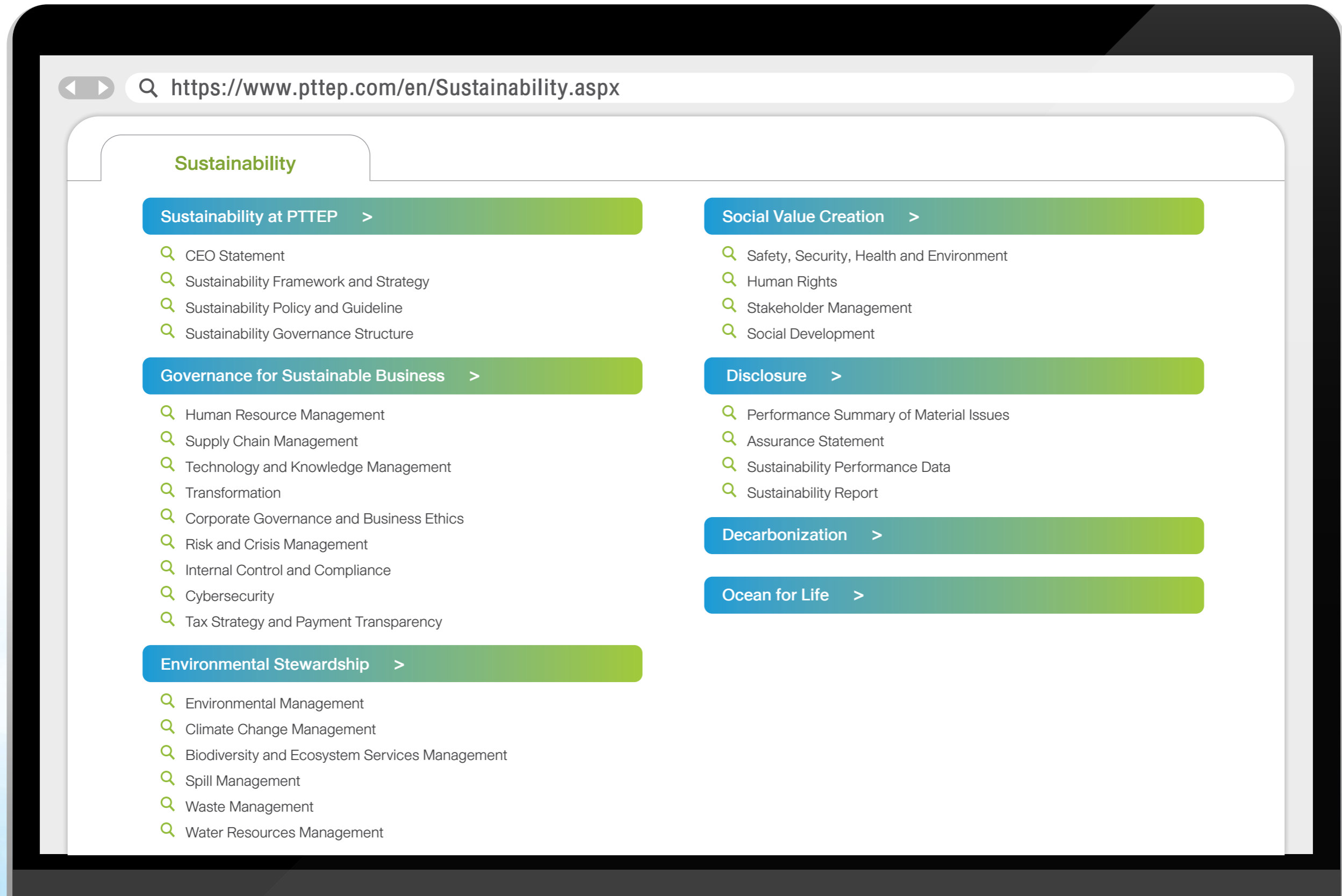


Best Practice Awards for Skill Development Project
 in Songkhla Province
**Global Corporate Sustainability Awards (GCSA)
 by Taiwan Institute for Sustainable Energy**



Appendix

For additional information of PTTEP Sustainability, please visit PTTEP website, Sustainability Topic.





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