

Welcome to your CDP Climate Change Questionnaire 2022

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

PTT Exploration and Production Public Company Limited (PTTEP), a Thai national petroleum exploration and production organization, is a publicly listed company on the Thai stock exchange, and a subsidiary of PTT Public Company Limited, Thailand's national petroleum company. PTTEP's mission is to operate globally to provide reliable energy supply and sustainable value to all stakeholders. Therefore, we set our vision to be an energy partner of choice through competitive performance and innovation for long-term value creations.

Operating under the philosophy and concept of sustainable development, PTTEP strives to provide energy security through continuous growth and competitive returns with less impact on environment and society through responsible operations in response to the stakeholder expectations. PTTEP developed the Sustainable Development Framework as the way of working and strong foundation to support our journey towards sustainability, including to achieve our vision of becoming the "Energy Partner of Choice". The framework comprises of three main components namely: High Performance Organization (HPO) or "Be Smart", Governance, Risk Management and Compliance (GRC) or "Be Good", and Stakeholder Value Creation (SVC) or "Be Responsible". The framework also corresponds with the United Nations Sustainable Development Goals (SDGs). PTTEP is confident that this strong foundation as well as conscious consideration of all stakeholders' interests will enable us to deliver value and foster sustainability for the wider world. (From We to World).

PTTEP has worldwide operations of 47 projects in 15 countries as of 31st, December 2021.

The company is engaged in the exploration, extraction, production and development of petroleum products. It produces crude oil, condensate, natural gas and liquefied petroleum gas (LPG). The company is also engaged in petroleum-related businesses, such as jetty, bulk tanks and warehouse management.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years
Reporting year	January 1, 2021	December 31, 2021	No

C0.3

(C0.3) Select the countries/areas in which you operate.

Malaysia
Myanmar
Thailand

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

USD

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your chosen approach for consolidating your GHG inventory.

Operational control

C-OG0.7

(C-OG0.7) Which part of the oil and gas value chain and other areas does your organization operate in?

Row 1

Oil and gas value chain

Upstream

Other divisions

C0.8

(C0.8) Does your organization have an ISIN code or another unique identifier (e.g., Ticker, CUSIP, etc.)?

Indicate whether you are able to provide a unique identifier for your organization	Provide your unique identifier
Yes, an ISIN code	TH0355A10Z04

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain
Director on board	<p>Climate related target has been set as corporate KPI and deployed through all employees, where the performance is followed up on a monthly basis.</p> <p>CEO is a member of Board of Directors (BoD) who provide direction on company vision, mission, objective and strategy of business development including sustainability. As a representative of BoD, CEO cascades company direction via top managements through relevant management committees including Safety, Security, Health and Environment (SSHE) Council.</p> <p>In addition, Risk Management Committee which is a Board level committee regularly assesses enterprise risks including the Climate related risks.</p>

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	<p>Reviewing and guiding strategy</p> <p>Reviewing and guiding major plans of action</p> <p>Reviewing and guiding risk management policies</p>	<p>In order to move towards our goal of Low-Carbon footprint organization and ensure achievement of GHG reduction target, climate related strategy and relevant policy and plan of actions are oriented by our Board of Director. The agenda for the meeting includes the climate related issues. Hence CEO and top management are responsible for briefing the BoD on that matter. For example, external parties require disclosure of PTTEP's supplementary data and</p>

	Reviewing and guiding annual budgets Reviewing and guiding business plans Setting performance objectives Monitoring implementation and performance of objectives Overseeing major capital expenditures, acquisitions and divestitures Monitoring and overseeing progress against goals and targets for addressing climate-related issues	information regarding climate related issues, e.g. company performance and target, etc. apart from published report, this issue will be brought to the BoD meeting for review and consideration.
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C1.1d

(C1.1d) Does your organization have at least one board member with competence on climate-related issues?

	Board member(s) have competence on climate-related issues	Criteria used to assess competence of board member(s) on climate-related issues
Row 1	Yes	Experienced in oversight and govern on the climate-related risks & opportunities, policy, strategy and management in both organization level and country level.

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Chief Executive Officer (CEO)	Both assessing and managing climate-related risks and opportunities	Quarterly

Sustainability committee	Both assessing and managing climate-related risks and opportunities ☞ ₁	Quarterly
Safety, Health, Environment and Quality committee	Both assessing and managing climate-related risks and opportunities ☞ ₂	Quarterly

☞₁CG-SD committee is a corporate governance and sustainability development committee to oversee the corporate sustainability strategy and framework including climate related issues of PTTEP.

☞₂SSHE council is a governance committee to oversee the management of safety, security, health and environment including climate related issues of PTTEP under the umbrella of Sustainability Development Strategy and Roadmap.

C1.2a

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).

PTTEP Board of Directors is the highest governance body who provides advice and approves PTTEP's Sustainable Development (SD) strategy and target that will be advised prior by the Corporate Governance and Sustainable Development Committee. Climate-related issues e.g. climate related strategy, relevant policy, risks and opportunities, GHG emission and reduction targets, being part of SD strategy, are oriented by our Board of Director who will monthly perform company performance review and monitoring. The climate related issues e.g. climate strategy and related business plan, acquisition and, etc. are also included in the agenda.

In addition, Risk Management Committee which is a Board level committee will regularly review enterprise risks including the Climate related risks while Corporate Governance Board is in charge of annual budget, progress of implementation and performance monitoring oversight on a quarterly basis.

Safety, Security, Health, Environment (SSHE) Council is the highest governance committee to oversee safety, security, health and environment of PTTEP including the climate related issues and chaired by the Chief Executive Officer (CEO). The SSHE Council consists of Executive and Senior Vice Presidents from functional groups and divisions with diverse backgrounds will provide a balanced view on SD and SSHE approach.

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).

Entitled to incentive	Type of incentive	Activity incentivized	Comment
Chief Executive Officer (CEO)	Monetary reward	Emissions reduction target Energy reduction project	The incentivized climate change related KPI for CEO is GHG intensity reduction target which is aligned with corporate target to achieve the GHG emission intensity reduction at 25% within 2030 compare to baseline 2012. The achievement of GHG reduction target accounted at 5% of overall CEO KPI. This links to salary increasing and bonus consideration of CEO. The achievement of this target also reflected in our achievement of DJSI listed company in which our company is awarded for 8 consecutive years (2014-2021).
All employees	Monetary reward	Other (please specify) Could be any of emission & energy reduction, efficiency improvement, behaviour change, supply chain engagement or company performance	In addition to emissions reduction target, PTTEP also bestows awards upon those within the company who have achieved excellence in the areas of innovation and performance: 1. Innovation Award - is a contest on innovative concepts or creative new ideas on work process, technology and green practice to support PTTEP business in both technical and non-technical areas. 2. Performance Excellence Award – is an award for employees (as an individual or a team) to increase operational efficiency, excellence, and benefit to business and society by submitting projects for the award competition through each functional group. The criteria include benefits and revenue generated to the company, cost savings, knowledge management and sharing, team collaboration effort across the organization and promotes green practice (low carbon and low environmental impacts). The team winner

			will receive a monetary award for their achievements.
All employees	Non-monetary reward	Other (please specify) emission & energy reduction, efficiency improvement, behaviour change, supply chain engagement or company performance	PTTEP Technical forum – is a non-monetary recognition for employees to build, maintain and develop the highest possible standards in the company’s technical capabilities and staff competencies; serve as an effective venue in sharing and transferring petroleum industry knowledge, best practices and technical experience, and to function as a challenging venue for PTTEP technical professionals to participate in and gain experience from a world-class petroleum industry technical conference.

C2. Risks and opportunities

C2.1

(C2.1) Does your organization have a process for identifying, assessing, and responding to climate-related risks and opportunities?

Yes

C2.1a

(C2.1a) How does your organization define short-, medium- and long-term time horizons?

	From (years)	To (years)	Comment
Short-term	0	5	The short-term time frame is chosen to align with PTTEP’s short-term strategy process. In addition, the 0-5 year time frame allows the use of historical time periods and probabilistic studies to forecast the short-term climate risks and opportunities.
Medium-term	6	15	The medium-term time frame draws upon climate modelling data analysis and probabilistic modelling to anticipate climatic changes in this time period.
Long-term	16	30	Lastly, the long-term analysis involves the use of climate scenario analysis in addition to the modelling data analysis and probabilistic study to understand the range of impacts that can occur over 15 years from now.

C2.1b

(C2.1b) How does your organization define substantive financial or strategic impact on your business?

PTTEP applies Corporate Risk Matrix for climate risk assessment in order to ensure consistency in risk management processes. A risk is assigned an impact rating from minor (1) to critical (5) in at least one of the seven following cost categories based on PTTEP's Risk Management Standard: project cost, legal / compliance, property damage, financial, people, environment and reputation. A substantive impact is defined differently across the former cost categories. In particular, substantive impact is based on quantitative limits for the project/schedule, financial, property damage and compliance costs categories, whereas qualitative criteria are set for the legal, people, environment and reputation categories.

The quantifiable measures of substantive impact under a "serious" (4) and "critical" (5) impact rating corresponds to the following:

- project cost + schedule: an impact on cost or schedule over 5% or 10%, respectively
- (legal/) compliance: fines or compensations >USD200k or >USD1 million, respectively
- property damage: loss >USD5 million or >USD50 million, respectively
- financial impact: a loss >1% of Net Income (NI)/Net Present Value (NPV) or >10% of NI/NPV, respectively

For the qualitative criteria, a "serious" (4) and "critical" (5) impact rating corresponds to the following:

- legal(/compliance): a (4) corresponds to suspension of stock trading, suspension of licenses and imprisonment for 6-12 months, whereas a (5) corresponds to the dismissal of the board and management, revocation of any licenses, and imprisonment for over 12 months.
- people: a (4) corresponds to multiple lost work day cases, one permanent disability or one fatality, whereas a (5) corresponds to multiple fatalities.
- environment: a (4) corresponds to a >10,000 bbl oil spill that requires regional assistance, whereas a (5) corresponds to a >100,000 bbl oil spill with devastating environmental impacts that requires international assistance.
- reputation: a (4) corresponds to national media coverage and local community protest, whereas a (5) corresponds to international media coverage and a formal complaint by an international authority. Based on the aforementioned definition of substantive impact, climate-related risk constitutes the impact as well as the likelihood (on a scale of 'rare' to 'almost certain') of that risk materialising.

C2.2

(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations

Upstream
Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

More than once a year

Time horizon(s) covered

Short-term
Medium-term
Long-term

Description of process

PTTEP has process to identify and assess climate related risks in which physical and transition risks are assessed individually, for which the Environment Management Department in collaboration with risk management team is responsible on a company level. The results of the risk assessments will be presented to high level management committee e.g. Risk Management Committee, SSHE Council. Through scenario analysis, climate-related risks and opportunities are assessed according to PTTEP's Risk Management Standard, and scored in an enterprise risk matrix based on the frequency and likelihood of risks. Risks identified in the assessment were ranked according to Likelihood (Score 1-5) and Impact which is categorized into 5 levels of impact. This provides PTTEP with a framework for continual review and assessment and allows the cost of potential impacts and management options to be integrated into business planning to determine any potential substantive impact. Climate-related risks and opportunities are monitored on a monthly basis, with a major update planned every five years or when the acquisition of new assets via PTTEP's SAP GRC system under the auspices of the corporate risk management team and risk management committee.

Specifically, for the physical risk assessment process, changes in intensity and frequency in tropical cyclones, heavy precipitation, droughts and heatwaves were reviewed for each of PTTEP's assets for the time periods 2025, 2035 and 2050. Subsequently, the possible impacts on PTTEP assets as a result of the expected changes were quantified in a financial impact assessment. An example of this was the possible impact of heatwaves. Heatwaves were identified as a baseline risk for our onshore S1 & L22/43 assets. In the 2020 Climate Change Risk Assessment, it was found that the frequency of heatwaves for the respective asset will increase by 340% in 2050. Based on this rate of change in heatwave frequency, the impact to PTTEP is calculated. For example, the impact to PTTEP personnel through potential lost productivity due to heat stress is estimated at approximately \$400,000 in 2050.

Specifically, for the transition risk assessment, policy, legal, market, technology and reputation risks were assessed. The approach was structured to review potential changes at asset-level, for market and carbon pricing risks, and at country-level, for the remaining transition risks, for the same time horizons. An example of this was carbon

pricing risk, as a subsection of policy risk, which was assessed at asset-level using the IEA SDS scenario. For our onshore S1 asset, for instance, it was found that carbon pricing could result in a 2.2% loss of income in 2050. The impacts arising from the different risks were quantified and management actions based on reported changes were identified.

C2.2a

(C2.2a) Which risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	This type of risk has been monitored since prior to the publication of the TCFD Recommendations. Regulatory risks are one of the key business areas under climate risk assessment. Current regulatory risk aspects are assessed, including regulations of existing products and services and reporting obligations. Specific examples include regulation of flaring activities, existing carbon markets such as the Thailand Voluntary Emission Reduction Program (T-VER), and an overview of nationally-determined contributions (NDCs) under the Paris Agreement for the relevant countries in which PTTEP operates or invest such as Thailand, Myanmar and Malaysia, etc.
Emerging regulation	Relevant, always included	This type of risk has been monitored since prior to the publication of the TCFD Recommendations. Regulatory risks are one of the key business areas under climate risk assessment as PTTEP expects policies and laws that regulate the O&G sector to develop in line with the Paris Agreement. Emerging regulatory risk aspects are assessed, including regulations of existing products and services, enhanced reporting obligations and increased pricing of GHG emissions. Specific examples include mandates under the 2015-2036 Thailand Oil Plan (to internalize pollution costs, infrastructural damage and other externalities), the Thailand Power Development Plan for 2015-2036, as well as future commitments to the Paris Agreement for the relevant countries in which PTTEP operates or invest such as Thailand, Myanmar and Malaysia, etc.
Technology	Relevant, always included	In the past, technology risk has been integrated with market risk assessments, including an increase in alternative energy technologies, decrease in fossil fuel investment, etc. For the 2020 Climate Change Risk Assessment, technology risk was assessed separately, with particular focus on 1) the risk of renewable and energy efficiency technologies reducing PTTEP's products demand and 2) the risk of low-carbon transportation reducing PTTEP's product demand.

Legal	Relevant, always included	Legal risks have in the past been integrated and merged with the regulatory risk assessment, and has focused on the adoption of carbon pricing penalties in the countries of PTTEP's operations or invest such as Thailand, Myanmar and Malaysia, etc. In addition, for the 2020 Climate Change Risk Assessment, country-level climate litigation risk was considered based on the proliferation of climate-related lawsuits in some countries of PTTEP's operations. An example of considered legal risk is the risk of not disclosing climate change risks in accordance with local regulations.
Market	Relevant, always included	Climate-related market risk has been considered since several years and has focused on the adaptation of the cap and trade regime, technological risks (e.g. alternative energy development), increase in insurance costs and decreases in fossil fuel investment. In addition, for the 2020 Climate Change Risk Assessment, climate-related risk was assessed based on asset retirement obligation costs and stranded asset risk on revenues.
Reputation	Relevant, always included	Reputational risk has been integrated as a cross-sectional "risk of risks" that is inherently linked to other climate-related risk categories. For instance, compliance with low-carbon supply chain initiatives, under the review of market risks, is tied to company reputation. In addition, for the 2020 Climate Change Risk Assessment, PTTEP assessed reputational risk through combining natural language processing methods with an economic event study approach to review the reputational impact on share price. Specifically, potential reputational damage from major industry accidents (oil spills) and climate litigation was assessed.
Acute physical	Relevant, always included	Acute physical risks can have a great impact on our facilities and surrounding environment. Acute physical risks have been monitored since PTTEP was established. Acute physical risks monitored include heatwaves, tropical cyclones, extreme precipitation, and water stress. In the 2020 Climate Change Risk Assessment, PTTEP assessed acute physical risks by analyzing site specific changes in climate indicators. For this, the CMIP5 global climate ensemble was used. PTTEP also quantified the impacts due to the changes in acute physical risks and integrated the results of this assessment in our enterprise risk management process.
Chronic physical	Relevant, always included	The effect of slowly changing physical parameters (increasing) may impact the longer term security of our facilities or surrounding environment. Chronic physical risks monitored include changes in drought patterns and sea level rise. In addition, for the 2020 Climate Change Risk Assessment, PTTEP assessed chronic physical risks by analyzing site specific changes in climate indicators. For this, the CMIP5 global climate ensemble was used. PTTEP also quantified the impacts due to the changes in chronic physical risks and integrated

		the results of this assessment in our enterprise risk management process.
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C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Acute physical
Heat wave

Primary potential financial impact

Increased indirect (operating) costs

Company-specific description

Increasing temperatures have been identified as a principal risk to PTTEP. Our scenario analysis shows that under the IPCC RCP 8.5 scenario the physical manifestations of climate change would be increasingly apparent, presenting financial risks to PTTEP. For our Malaysia offshore asset (Sabah & Sarawak) frequency and intensity changes in heatwaves would lead to reducing a worker's capacity to do work. Moderate intensity work at 33–34°C can reduce a worker's capacity by 50%. O&G outdoor work is very often physically demanding and requires the use of protective clothing and gear. Impact of excessive heat on O&G workers is expected to be higher. Time taken to perform outdoor operations and preventive/corrective maintenance work may therefore increase during periods of excessive heat thus, resulting in increased maintenance costs.

Time horizon

Medium-term

Likelihood

Likely

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

6,900,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

the impact of heat waves for Malaysia offshore asset quantified in USD was derived from change of worker productivity due to temperature change , the length of heatwave and its total revenue, which is estimated at USD 6.9 million.

Cost of response to risk

2,000,000

Description of response and explanation of cost calculation

Response options would be to:

1. Reduce the number of working hours
2. Postpone scheduled maintenance during heatwaves
3. Wear lightweight loose-fitting clothing
4. Introduce obligatory drinking breaks

The cost calculation basis is from the estimation on the work hours lost , which is estimated at USD 2 million.

Comment

-

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Acute physical
Cyclone, hurricane, typhoon

Primary potential financial impact

Decreased revenues due to reduced production capacity

Company-specific description

Our baseline physical risk assessment showed that our Malaysia, Myanmar and Thailand offshore assets are located in areas where tropical cyclones are apparent. In our risk assessment it became apparent that tropical cyclones have caused production interruptions on these assets. During these production interruptions the flow rate is decreased by 50% on average, and the length of the production interruption is 5 days on average. Our scenario analysis using the IPCC RCP 4.5 shows that the frequency of tropical cyclones is expected to increase for the Malaysia and Thailand offshore assets, presenting increasing financial risk to PTTEP.

Time horizon

Medium-term

Likelihood

Unlikely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

17,500,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

The 2020 Climate Change Risk Assessment showed that if a tropical cycle were to hit Thailand, it would impact all 3 Thailand Offshore assets. From historical data on tropical cyclone impacts, the assessment found that the flow rate was reduced by 50% over an average of 5 days. The expected impact is calculated as Production reduction length * Flow rate reduction * Production levels of the respective assets.

Cost of response to risk

10,000,000

Description of response and explanation of cost calculation

Based on our engineering team's inputs, the management cost is the lump sum of structurally reinforcing the flare booms and communication towers of our offshore assets, which is estimated at USD 10 million.

Comment

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Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Emerging regulation
Carbon pricing mechanisms

Primary potential financial impact

Increased indirect (operating) costs

Company-specific description

PTTEP considers the impact of carbon taxes and/or cap and trade mechanisms substantial to its operations in Thailand as part of future internal emissions reduction requirements and may also impact our strategy on diversification to low carbon energy technologies. PTTEP already takes part in the Thailand Voluntary Emission Reduction Program (T-VER) but anticipates that carbon pricing could become more stringent in the long-term under the Thailand Greenhouse Gas Management Organization (TGO) in line with the Thailand Climate Change Master Plan 2015-2050 and planned carbon intensity targets relevant to PTTEP under the Thailand Power Development Plan.

Time horizon

Long-term

Likelihood

Unlikely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

59,600,205

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

In its 2020 Climate Risk Assessment, PTTEP assumes that our operations in Thailand may be subject to a carbon price as high as USD 179.7/tCO₂e based on the IEA SDS carbon price extrapolated to 2050 and our Scope 1+2 emissions which amounts to USD

59,600,205 for PTTEP's assets in Thailand. The figure uses a 5% discount rate.

Cost of response to risk

89,680,618

Description of response and explanation of cost calculation

In its 2020 Climate Risk Assessment, PTTEP assumed an internal carbon price (ICP) as high as USD 179.7/tCO₂e based on the IEA SDS carbon price extrapolated to 2050 across Scope 1+2 emissions which amounts to USD 89,680,618 for all assets in Thailand, Myanmar and Malaysia. Figure uses a 5% discount rate.

Comment

It was assumed that an integrated ICP would guide investment decisions, simultaneously manage market-related risks such as stranded assets and mitigate climate litigation risk. Therefore, a stringent ICP based on the SDS scenario would function as an overarching risk management measure.

Identifier

Risk 4

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Technology
Transitioning to lower emissions technology

Primary potential financial impact

Decreased revenues due to reduced demand for products and services

Company-specific description

In line with SDS Scenario, it is forecast that oil consumption will decline by 61% by 2040, renewables consumption will increase by 215% and natural gas consumption will decline by 4%. As natural gas and liquid account for 71% and 29%, respectively, in terms of value, PTTEP anticipates that this is a significant source of risk. In particular, Thailand already aims to achieve a carbon neutrality target by 2050 and achieve a target of 50% of domestic energy produced by renewables by 2050 according to the Thailand Long-Term GHG Emission Development Strategy.

Time horizon

Medium-term

Likelihood

Unlikely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

10,265,487,611

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

The financial impact was assessed based on the International Energy Agency's (IEA's) World Energy Outlook 2019 (WEO) demand forecasts. The Stated Policies Scenario (SPS) was considered as a base-case scenario where technology risks have no increased impact and the Sustainable Development Scenario (SDS) as the scenario where technology risks are most significant due to high deployment rates. The impact was derived by estimating foregone revenue due to demand reduction in the SDS scenario compared to SPS scenario. Based on this demand reduction, we estimate the change in demand to our products in a world aligned with the IEA SDS, which is then calculated into a potential financial impact value using our oil and gas price projections. The financial impact is specific to PTTEP's operations in Thailand. A discount rate of 5% is assumed.

Cost of response to risk

1,009,629,000

Description of response and explanation of cost calculation

The management option for technology risk is to invest in the diversification of PTTEP's business into low-carbon technologies and energy efficiency technologies, including but not limited to renewable energy and emerging low-carbon materials. The goal of these investments is to provide PTTEP with an additional income stream that is not based solely on oil and gas. It is assumed that 15% of PTTEP's revenue is dedicated for managing technological risk as a whole at company-level. An expected IRR of 5-10% and a discount rate of 5% are assumed.

Comment

Identifier

Risk 5

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Reputation

Increased stakeholder concern or negative stakeholder feedback

Primary potential financial impact

Decreased asset value or asset useful life leading to write-offs, asset impairment or early retirement of existing assets

Company-specific description

As a “risk of risks”, reputational risk is integrated into PTTEP’s management framework as an overarching risk. In August 2009, PTTEP experienced an oil spill at its Montara operations in Australia, resulting in a share price plunge from THB 180 to 50 at the end of 2009 (with a total of 3,969,985,400 shares). However, this drop in the share price also included the impact of the global financial crisis which could not be sorted out. PTTEP considers the possibility that this could occur again with considerable financial consequences.

Time horizon

Short-term

Likelihood

Very unlikely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

5,100,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Impact was derived by compiling a database of major industry accidents and using both economic net worth or event study approaches to estimate cumulative abnormal returns, i.e. the reputational damage represents the change in the value of reputation from before to after the incident. The impact estimation could be at approximately 32% of market cap (2019 year end, PTTEP market cap = 494 Billion THB (31 THB = USD 1).

Cost of response to risk

21,290,000

Description of response and explanation of cost calculation

The cost of management represents PTTEP’s budget (660 MMTHB) to improve branding, image and reputation. Under this umbrella, this includes media, advertising,

public relations, philanthropy, social investment projects and CSR. The company is committed to continue to ensure the transparency of sustainability performance through our annual and sustainability reports to stakeholders.

Comment

C2.4

(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.4a

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Opp1

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

Participation in carbon market

Primary potential financial impact

Other, please specify

Reputational benefits resulting in increased demand for goods/services

Company-specific description

PTTEP anticipates more stringent carbon trading requirements/increased GHG pricing in the future. Proactive engagement and sustainable leadership through participation in carbon markets is seen for PTTEP as a way to reduce company-level stigmatization associated with the Oil & Gas industry. PTTEP has already been involved in carbon markets and have identified approximately 300,000 tCO₂e/yr of GHG reduction that can be certified as carbon credits, which will reduce PTTEP's cost of GHG mitigation projects.

Time horizon

Long-term

Likelihood

Very likely

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

9,240,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

The financial impact figure can be recalculated using the latest carbon offset prices from the State of the Voluntary Carbon Markets Report (USD 2.8/tCO₂e for energy efficiency / fuel switching projects) for an estimated 300,000 tCO₂e worth of GHG reduction unit per year for 11 years (no. of years implementing the GHG reduction initiatives from 2019 until 2030 target year to reduce 25% GHG intensity reduction).

Cost to realize opportunity

13,680,000

Strategy to realize opportunity and explanation of cost calculation

The strategy to realize reputational and cost saving opportunities is to proactively engage in the carbon trading market and develop our GHG projects that can be certified as carbon credits. Based on an average project development cost of 5.7 USD/tCO₂e reduced, the cost to realise opportunity is given as 5.7USD/tCO₂e (estimated project development cost) x 300,000 tCO₂e/yr (annual GHG reduction) for 8 years, amounting to USD 13,680,000.

Comment

-

Identifier

Opp2

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Development of new products or services through R&D and innovation

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

PTTEP's R&D division investigates multiple innovative projects (e.g. purifying natural gas to liquid hydrogen, CCS from waste/excess/flare gases, etc.) as part of the company's wider organizational response to the climate change crisis. Out of these investigations, the CO₂ conversion to hydrocarbons is identified as the most promising. This opportunity would be mostly for our onshore facilities for now.

Time horizon

Long-term

Likelihood

More likely than not

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

381,720,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

The financial impact was calculated by estimated revenue generated from the potential low carbon R&D products and services. However, the exact explanation of how the total number is derived cannot be provided in detail since it is under our research and development phase.

Cost to realize opportunity

47,000,000

Strategy to realize opportunity and explanation of cost calculation

A new business unit has been established to facilitate business transformation, including technological development. PTTEP's R&D division has studied a number of innovative projects in which green practices have been one of the key themes that have been focused on. For example, CO₂ conversion to high valued products, e.g. methanol, carbonate-based products, etc. is one of the on-going projects. To develop and realize these projects, PTTEP has allocated a company budget of at least 3% of annual net profit or 47 MM USD. Note that the costs to realize this opportunity only cover the R&D costs. It does not yet include the costs of machinery for realizing these opportunities, as it is uncertain how much this would be.

Comment

-

Identifier

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

Natural gas is a key fuel source in the low – carbon transition. In the IEA SDS, the natural gas demand is expected to remain at a significant level, while the oil demand is expected to decrease faster than natural gas. As higher demand on natural gas is expected, this will have a positive impact on revenue for PTTEP who has striven to maintain a natural gas-based portfolio. To maximize the opportunity, PTTEP is focused on maintaining a high natural gas-based portfolio (which is currently 56% by revenue) and diversifying towards energy storage and renewable.

Time horizon

Long-term

Likelihood

More likely than not

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

4,095,840,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

The financial implication is the revenue generated from natural gas sales in 2021.

Cost to realize opportunity

2,706,017,000

Strategy to realize opportunity and explanation of cost calculation

The strategy is to continue to focus on natural gas exploration and production by maintaining a natural gas biased portfolio above 56% by revenue. Furthermore, we will continue to improve operational efficiency in order to minimise natural gas consumption during the production process and hence maximise the amount of natural gas sales.

The annual cost is estimated by taking the total operating, exploration and development expenses of operating projects that produce natural gas.

Comment

-

C3. Business Strategy

C3.1

(C3.1) Does your organization's strategy include a transition plan that aligns with a 1.5°C world?

Row 1

Transition plan

Yes, we have a transition plan which aligns with a 1.5°C world

Publicly available transition plan

Yes

Mechanism by which feedback is collected from shareholders on your transition plan

We have a different feedback mechanism in place

Description of feedback mechanism

- materiality survey at triannual basis to get information on interests/concerns/recommendations from all stakeholder groups which is including shareholders.
- analyst meeting at quarterly basis to present plan/progress and get recommendation against our business plan (including transition plan)

Our target, strategy and transition plan in response to climate-related issue also has been announced in our AGM meetings.

Frequency of feedback collection

More frequently than annually

Attach any relevant documents which detail your transition plan (optional)

Our transition plan has been incorporated in our announcement on the net-zero GHG emission target and disclosed publicly via website:

<https://www.pttep.com/en/Sustainabledevelopment/Net-Zero-Ghg-Emissions.aspx>

C3.2

(C3.2) Does your organization use climate-related scenario analysis to inform its strategy?

Use of climate-related scenario analysis to inform strategy	
Row 1	Yes, qualitative and quantitative

C3.2a

(C3.2a) Provide details of your organization’s use of climate-related scenario analysis.

Climate-related scenario	Scenario analysis coverage	Temperature alignment of scenario	Parameters, assumptions, analytical choices
Transition scenarios IEA SDS	Company-wide		Five major transition risks were addressed: Policy, legal, market, technology and reputation. The analysis was split into three parts; short-, mid- and long-term transition risks.
Transition scenarios Customized publicly available transition scenario	Company-wide	1.5°C	This scenario is followed the IPCC's 1.5 degree scenario and guideline. Five major transition risks were addressed: Policy, legal, market, technology and reputation. The analysis was split into three parts; short-, mid- and long-term transition risks.
Physical climate scenarios RCP 4.5	Company-wide		Five major physical climate change hazards were addressed: heatwaves, extreme precipitation, drought, water stress and tropical cyclones (hurricanes). The analysis was split into three parts; short-, mid- and long-term physical climate risks.

Physical climate scenarios RCP 8.5	Company-wide		Five major physical climate change hazards were addressed: heatwaves, extreme precipitation, drought, water stress and tropical cyclones (hurricanes). The analysis was split into three parts; short-, mid- and long-term physical climate risks.
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C3.2b

(C3.2b) Provide details of the focal questions your organization seeks to address by using climate-related scenario analysis, and summarize the results with respect to these questions.

Row 1

Focal questions

What is the PTTEP's exposure to climate change and the impact of climate change on our operations and supply chain and how the future might look if certain trends were to continue or certain conditions were met.

Results of the climate-related scenario analysis with respect to the focal questions

Scenario analysis allows us to see what would happen under different mitigation, warming and socioeconomic scenarios. Scenario analysis also help us to identify and understand on the followings:

1. variety: envision and adapt to a wide range of possible futures.
2. comparability: compare how we are measuring, mitigating and adapting to specific risks.

C3.3

(C3.3) Describe where and how climate-related risks and opportunities have influenced your strategy.

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Products and services	Yes	There are many socioeconomic scenarios that have been applied to address the impact of specific transition risks (policy, legal, technology, market, and reputation) to our products. The risks and opportunities regarding energy and electricity prices, climate policies, carbon prices, and energy mix, market and technology influenced our strategy in term

		of integration of the result into the company climate related goal and targets, e.g. our roadmap to become the low-carbon footprint organization, target of GHG emission intensity reduction and net-zero GHG emission target. This is also directly influenced our business objectives and strategy to explore investment opportunities in potential new business to enhance the company's competitiveness and future sustainable growth. This included a promotion of LPG and natural gas as well as aiming to increase the share of renewable energy in the energy mix.
Supply chain and/or value chain	Yes	<p>Both physical and market risk may impact to company supply chain, e.g. disruption to supply chain (product transportation) from water flooding, storm and drought and/or the market shifts to more environmental stewardship products/services.</p> <p>With this reason, PTTEP has in place the PTTEP Vendor Sustainable Code of Conduct which governs the conduct of vendors on issues relating to their business operations and ethics, human rights, occupational health and safety, as well as environmental expectations. The company also set the goal to increase the green procurement (for products/services with low carbon and low environmental impacts) to 30% of total spending by 2022. To achieve this goal, we developed the "Green Procurement Criteria" for each of the work categories, which were then certified by the Thailand Environment Institute (TEI), and also developed an approach to evaluate the environmental considerations of procurement practices.</p>
Investment in R&D	Yes	Due to global climate change situation leading to alternative energy adoption, i.e. renewable energy, PTTEP as an oil and gas exploration and production company will be impacted from this transition to low carbon society in case new technologies and new business opportunities are not developed for future trend. With this regard, PTTEP has established Technology Management Division since 2013 with objectives to enhancing core E&P business, minimize environmental impact, explore future energy transition. One of the key objectives of new organization is to explore new business opportunity including low carbon technology e.g. CCU&S and renewable energy.
Operations	Yes	The identified physical risks have potential to impact to PTTEP operations, e.g. heatwaves were the main risks, with potential impacts on all PTTEP's facilities, highest frequency of tropical cyclones in the Gulf of Thailand

		and the Gulf of Martaban (Myanmar). However, the design basis of existing operations is still valid, with expected climate conditions. In some instances, changes to certain variables by 2035 are within the design threshold. Therefore, the physical risks which may impact our operations in future are under our close monitoring.
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C3.4

(C3.4) Describe where and how climate-related risks and opportunities have influenced your financial planning.

	Financial planning elements that have been influenced	Description of influence
Row 1	Revenues	<p>The world is progressively switching towards more and more ambitious climate policies. In terms of carbon pricing as a policy risk, according to the study of the World Bank, around 57 carbon pricing initiatives have been implemented, or scheduled for implementation, in 46 national and 28 subnational jurisdictions. At least 20% of global emissions (11 GtCO₂e) is covered by a carbon price ranging from USD 1 to 127/tCO₂e, with 51% of emissions covered prices below USD 10/tCO₂e. It is expected that this amount will increase significantly over the years, as a lot of countries are in the process of entering carbon pricing ETS. The international IEA WEO scenarios projected increases in carbon prices, which could put PTTEP under risk.</p> <p>The direct influence of the policy risk in term of an increasing of carbon pricing, for example, is reflected in our 2020-2030 Sustainable Development Plan which target to explore investment opportunities in potential new business to enhance the company's competitiveness and future sustainable growth. With the SD plan, PTTEP aims at least 20% of Net Income from new business. This is included a promotion of LPG and natural gas as well as aiming at increase the share of renewable energy in the energy mix.</p>

C3.5

(C3.5) In your organization's financial accounting, do you identify spending/revenue that is aligned with your organization's transition to a 1.5°C world?

Yes

C3.5a

(C3.5a) Quantify the percentage share of your spending/revenue that is aligned with your organization's transition to a 1.5°C world.

Financial Metric

Other, please specify

Sustainable Development Budget

Percentage share of selected financial metric aligned with a 1.5°C world in the reporting year (%)

7

Percentage share of selected financial metric planned to align with a 1.5°C world in 2025 (%)

80

Percentage share of selected financial metric planned to align with a 1.5°C world in 2030 (%)

80

Describe the methodology used to identify spending/revenue that is aligned with a 1.5°C world

Under the challenging circumstances, PTTEP operates its business as a Cautious Diversified Player, emphasizing on both petroleum exploration and production business (Core E&P) and diversification to new businesses (Beyond E&P), leveraging the Company's knowledge and technology, which include power business from natural gas, renewable energy and future energy. Moreover, we also aim to maintain the right balance of social, economic and environmental safeguard as guided by our Sustainable Development Framework (SDF). Therefore, we have accounted the total expenses associated with our SDF which is 'aligned with a 1.5°C world'. As part of our net-zero by 2050 commitment, PTTEP has continued the concrete implementation of various greenhouse gas management projects such as flare gas recovery and utilization, energy efficiency improvement, adoption of renewable energy in operations and feasibility studies to apply the Carbon Capture, Utilization and Storage (CCUS) technology for offshore operations as well as greenhouse gas offsetting projects like forestation and carbon credits purchasing to offset the rest of the greenhouse gas emissions. The percentage share provided is calculated based on the expense on those projects against overall budget set to drive the company in aligned with our SDF.

C4. Targets and performance

C4.1

(C4.1) Did you have an emissions target that was active in the reporting year?

Absolute target

Intensity target

C4.1a

(C4.1a) Provide details of your absolute emissions target(s) and progress made against those targets.

Target reference number

Abs 1

Year target was set

2021

Target coverage

Company-wide

Scope(s)

Scope 3

Scope 2 accounting method

Scope 3 category(ies)

Category 10: Processing of sold products

Base year

2020

Base year Scope 1 emissions covered by target (metric tons CO2e)

Base year Scope 2 emissions covered by target (metric tons CO2e)

Base year Scope 3 emissions covered by target (metric tons CO2e)

3,350,026

Total base year emissions covered by target in all selected Scopes (metric tons CO2e)

3,350,026

Base year Scope 1 emissions covered by target as % of total base year emissions in Scope 1

Base year Scope 2 emissions covered by target as % of total base year emissions in Scope 2

Base year Scope 3 emissions covered by target as % of total base year emissions in Scope 3 (in all Scope 3 categories)

67

Base year emissions covered by target in all selected Scopes as % of total base year emissions in all selected Scopes

67

Target year

2030

Targeted reduction from base year (%)

15

Total emissions in target year covered by target in all selected Scopes (metric tons CO2e) [auto-calculated]

2,847,522.1

Scope 1 emissions in reporting year covered by target (metric tons CO2e)

Scope 2 emissions in reporting year covered by target (metric tons CO2e)

Scope 3 emissions in reporting year covered by target (metric tons CO2e)

4,036,416

Total emissions in reporting year covered by target in all selected scopes (metric tons CO2e)

4,036,416

% of target achieved relative to base year [auto-calculated]

-136.5939647434

Target status in reporting year

Underway

Is this a science-based target?

No, but we anticipate setting one in the next 2 years

Target ambition

Please explain target coverage and identify any exclusions

PTTEP's sole customer for natural gas product is PTT which PTTEP's products have been further processing by PTT. 67 % by volume of PTTEP hydrocarbon product sold to PTT , therefore, the target coverage is considered at 67%.

PTT has set new company-wide target in 2021 to reduce GHG emissions at 15% by 2030 from 2020 as base year. Therefore, this target is also cascaded to PTTEP natural gas product sold to PTT. PTTEP natural gas supplied to PTT was contributed at approx. 36% (as of 2020) of total gas feed of PTT gas separation plant , therefore, the normalized base year emissions covered by target calculated at 36% of total 2020 base year emission at 10,574,578 tonneCO_{2e} or equal to 3,806,848 tonneCO_{2e}. However, 12% of total gas feed will be a feedstock for petrochemical product which considered as non-combustible product. Therefore, only 88% will be combusted and turn into GHG emission ($0.88 * 3,806,848 = 3,350,026$ tonneCO_{2e}).

Total emissions in 2021 reporting year was calculated on the basis that in 2021 PTTEP natural gas supplied to PTT was contributed at approx. 42% of total gas feed of PTT gas separation plant , therefore, emissions covered by target calculated at 42% of total 2021 emission at 10,921,040 tonneCO_{2e} or equal to 4,586,837 tonneCO_{2e}. However, 12% of total gas feed will be a feedstock for petrochemical product which considered as non-combustible product. Therefore, only 88% will be combusted and turn into GHG emission ($0.88 * 4,586,837 = 4,036,416$ tonneCO_{2e}).

Plan for achieving target, and progress made to the end of the reporting year

To achieve the target of GHG emissions reduction for Scope 3 - Processing of Sold Products, it is planned to increase the efficiency in the manufacturing process, enhance renewable energy consumption & energy conservation and also research and study the CCS technology. However, progress in the end of the reporting year which considered as short timeframe comparing with the base year and the target year is still required an improvement.

List the emissions reduction initiatives which contributed most to achieving this target

C4.1b

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number

Int 1

Year target was set

2013

Target coverage

Company-wide

Scope(s)

Scope 1

Scope 2

Scope 2 accounting method

Location-based

Scope 3 category(ies)

Intensity metric

Other, please specify

tonneCO₂e/KtonneProduction

Base year

2012

Intensity figure in base year for Scope 1 (metric tons CO₂e per unit of activity)

293.5

Intensity figure in base year for Scope 2 (metric tons CO₂e per unit of activity)

0.6

Intensity figure in base year for Scope 3 (metric tons CO₂e per unit of activity)

Intensity figure in base year for all selected Scopes (metric tons CO₂e per unit of activity)

294.1

% of total base year emissions in Scope 1 covered by this Scope 1 intensity figure

99.8

% of total base year emissions in Scope 2 covered by this Scope 2 intensity figure

0.2

% of total base year emissions in Scope 3 (in all Scope 3 categories) covered by this Scope 3 intensity figure

% of total base year emissions in all selected Scopes covered by this intensity figure

100

Target year

2030

Targeted reduction from base year (%)

25

Intensity figure in target year for all selected Scopes (metric tons CO₂e per unit of activity) [auto-calculated]

220.575

% change anticipated in absolute Scope 1+2 emissions

8

% change anticipated in absolute Scope 3 emissions

0

Intensity figure in reporting year for Scope 1 (metric tons CO₂e per unit of activity)

222.5

Intensity figure in reporting year for Scope 2 (metric tons CO₂e per unit of activity)

0.6

Intensity figure in reporting year for Scope 3 (metric tons CO₂e per unit of activity)

Intensity figure in reporting year for all selected Scopes (metric tons CO₂e per unit of activity)

223.1

% of target achieved relative to base year [auto-calculated]

96.5657939476

Target status in reporting year

Underway

Is this a science-based target?

No, but we anticipate setting one in the next 2 years

Target ambition

Please explain target coverage and identify any exclusions

In early 2013, PTTEP has established GHG intensity reduction target by 25% in 2030 compared with 2012 base year. This target covering 100% all operating assets under

PTTEP operational control.

Plan for achieving target, and progress made to the end of the reporting year

In 2021, PTTEP plan to achieve the GHG intensity at 13% and has achieved more than 24% of the GHG intensity reduction, with 2.7 million tonnes of CO2 equivalent reduction in accumulation. We has confidence that our target of 25% GHG intensity reduction can be achieved within 2022. Therefore, we set new target to achieve GHG intensity reduction at least 30% in 2030 comaring with 2020 base year.

The Company has continued its concrete implementation of various greenhouse gas management initiatives such as flare gas recovery and utilization, energy efficiency improvement, adoption of renewable energy in operations and feasibility studies to apply the Carbon Capture, Utilization and Storage (CCUS) technology for offshore operations as well as greenhouse gas offsetting projects like forestation and carbon credits purchasing to offset the rest of the greenhouse gas emissions.

List the emissions reduction initiatives which contributed most to achieving this target

C4.2

(C4.2) Did you have any other climate-related targets that were active in the reporting year?

No other climate-related targets

C-OG4.2d

(C-OG4.2d) Indicate which targets reported in C4.1 a/b incorporate methane emissions, or if you do not have a methane-specific emissions reduction target for your oil and gas activities, please explain why not and forecast how your methane emissions will change over the next five years.

Both GHG absolute and intensity reduction target are already incorporated the methane emissions. Since 2013 until present, PTTEP has developed and continued our own methane leak detection and repairing program for both onshore and offshore operating assets in Thailand, Myanmar and Malaysia. As of 2021, methane is accounted only 4% of total GHG emission from our operations. This is a result of our methane leak detection and repairing program, thus, we expected that our methane emissions would be reduced to lower than 1% over the next five years.

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	3	16,000
To be implemented*	20	454,000
Implementation commenced*	0	0
Implemented*	20	358,187
Not to be implemented	0	0

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative category & Initiative type

Other, please specify
 Other, please specify
 Process Emission Reduction

Estimated annual CO2e savings (metric tonnes CO2e)

28,316

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

850,960

Investment required (unit currency – as specified in C0.4)

1,880,000

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

PTTEP aims to reduce continuous flaring as much as possible. Continuous flaring is accounted under scope 1 emissions. Since 2013 The Sao-Thien A Oil Field Flare Gas Recovery and Utilization Project in Sukhothai, Thailand has been implemented, the development of recovering and utilizing the associated gas emitted from Sao-Thien A oil field. In the absence of the proposed project, the associated gas would have been flared resulting in the release of GHG to the atmosphere. Investment required was calculated using the values from the project's PDD from the UNFCCC CDM website. The total investment required was calculated by multiplying the operating cost by the lifetime of the initiative, this value was then combined with the capital investment value to derive the total investment required. Investment required was USD 1.88 Million.

Initiative category & Initiative type

Energy efficiency in production processes
Waste heat recovery

Estimated annual CO₂e savings (metric tonnes CO₂e)

7,422

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

782,374

Investment required (unit currency – as specified in C0.4)

1,900,000

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Since 2014, PTTEP installed Heat Recovery Steam Generator (HRSG) in Sirikit oil field, to recover waste heat from compressors and utilize in steam boiler. In 2021, 7,422 tonnes CO₂ equivalent of GHG reduction was achieved. Investment required was USD 1.9 Million.

Initiative category & Initiative type

Other, please specify
Other, please specify

Process Emission Reduction

Estimated annual CO₂e savings (metric tonnes CO₂e)

18,939

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

2,000,995

Investment required (unit currency – as specified in C0.4)

21,620,000

Payback period

4-10 years

Estimated lifetime of the initiative

11-15 years

Comment

Trunk flow line project aims to reduce flaring at remote stations of Sirikit Oilfield by transporting excess gas through pipelines to be consolidated and reused at the main production facilities. The project started to operate in the 4th quarter of 2016. Investment required was USD 21.62 Million .

Initiative category & Initiative type

Other, please specify

Other, please specify

Process Emission Reduction

Estimated annual CO₂e savings (metric tonnes CO₂e)

3,257

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

96,563

Investment required (unit currency – as specified in C0.4)

317,000

Payback period

4-10 years

Estimated lifetime of the initiative

6-10 years

Comment

In mid 2018, PTTEP installed the gas ejector in Sirikit Oil Field to recover the low pressure flare and return it back into the gas production process which would be otherwise flared. The cost for gas ejector installation is approx. USD 0.32 million. In 2021, the recovery is equivalent to reduction of 3,257 tCO₂e of GHG emissions.

Initiative category & Initiative type

Other, please specify

Other, please specify

Process Emission Reduction

Estimated annual CO₂e savings (metric tonnes CO₂e)

123,547

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

1,640,052

Investment required (unit currency – as specified in C0.4)

10,000,000

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

The project has been implemented at GBS asset which gas is recovered from condensate production and puts it back into the gas production process which would otherwise be flared. In 2021, the recovery is equivalent to reduction of 123,547 tCO₂e of GHG emissions. Investment required was USD 10 Million.

Initiative category & Initiative type

Non-energy industrial process emissions reductions

Process material substitution

Estimated annual CO2e savings (metric tonnes CO2e)

36,654

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

1,158,812

Investment required (unit currency – as specified in C0.4)

1,664,520

Payback period

1-3 years

Estimated lifetime of the initiative

3-5 years

Comment

Since 2019 PTTEP applied more-efficient membranes and reduced CO2 emissions by changing membranes type for flare gas separation process at Arthit and Greater Bongkot South fields in the Gulf of Thailand. The membranes increased the efficiency of CO2 separation from natural gas and can reduce the GHG emission at 36,654 tCO2e per year. Annual monetary savings in the original currency was MUSD 1.159 million . Investment required was USD 1.66 million.

Initiative category & Initiative type

Energy efficiency in production processes
Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

23,443

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

400,201

Investment required (unit currency – as specified in C0.4)

0

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

To improve the energy efficiency in production processes, PTTEP has implemented the energy efficiency projects at Arthit, ZPQ and ZTK Production platform by optimizing operations condition e.g. running one of two sea water pumps used to generate cooling water for other machines, running single gas-turbine generator, and optimizing the operating pressure in pipeline. This could reduce the fuel gas consumption and there is no investment required, just optimizing the operation and process condition.

Initiative category & Initiative type

Transportation
Company fleet vehicle efficiency

Estimated annual CO2e savings (metric tonnes CO2e)

51,817

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

16,405,702

Investment required (unit currency – as specified in C0.4)

28,000,000

Payback period

1-3 years

Estimated lifetime of the initiative

11-15 years

Comment

Emissions reductions for the marine transportation fleet were under scope 1 emissions since all transportation involved was owned or controlled by PTTEP. In 2015, the company implemented the New Marine Vessel project by increasing the efficiency of marine transportation in the Gulf of Thailand. After that in 2018, PTTEP expanded the project to international asset by proceeding the Smart Marine Model Project in the Republic of the Union of Myanmar, through the Centralized Vessel Utilization Management system. As a result, in 2021 the average fuel consumption of the vessels

have been reduced 51,817 tCO₂e per year. Annual monetary savings in the original currency was USD 10.62 million . Investment required was USD 28 million.

Initiative category & Initiative type

Energy efficiency in production processes
Smart control system

Estimated annual CO₂e savings (metric tonnes CO₂e)

59,770

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

8,497

Investment required (unit currency – as specified in C0.4)

0

Payback period

<1 year

Estimated lifetime of the initiative

11-15 years

Comment

To improve the production efficiency , PTTEP has implemented several projects at Thalinald Offshore Assets: Arthit, GBN and GBS) by optimizing the process operations, for example:

- Optimization of flash gas recovery unit at GBN
- Reduction of stripping and purge gas at GBN & GBS
- Optimization of CO₂ membrane unit at ART

Initiative category & Initiative type

Fugitive emissions reductions
Oil/natural gas methane leak capture/prevention

Estimated annual CO₂e savings (metric tonnes CO₂e)

5,001

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

66,748

Investment required (unit currency – as specified in C0.4)

140,000

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

To minimize methane leak in the operation process, PTTEP has conducted the methane surveys at S1 and can improve the fugitive emission reporting and reduce the methane emissions at approximately 5000 tCO₂e/year.

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Dedicated budget for low-carbon product R&D	In order to achieve our vision of being an energy partner of choice through competitive performance and innovation for long-term value creation, this target has been included in the long term business strategy, and dedicated budgets for energy efficiency are included in our budget. We have also publicly disclosed our intentions of reducing and offsetting our GHG emissions in which this serves as a long term public commitment which drives initial investments into projects that can reduce and offset GHG. In addition, development of low carbon products is in PTTEP research & development plan.
Other Employee Engagement	In order to achieve our vision of being an energy partner of choice through competitive performance and innovation for long-term value creation, this target has been included in the long term business strategy. The company wide target as well as the key performance indicators are set. The company KPI is then cascaded down to each individual employee, where monetary incentives such as bonuses, monetary recognitions and awards are given to employees with the best GHG emissions reduction project implementations and results.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products.

Level of aggregation

Group of products or services

Taxonomy used to classify product(s) or service(s) as low-carbon

Other, please specify

GHG protocol and IOGP environmental performance report

Type of product(s) or service(s)

Other

Other, please specify

Low energy consumption products

Description of product(s) or service(s)

As PTTEP is an upstream business, low carbon product has been considered from the production of assets which consume energy and emit GHG lower than the IOGP average.

Have you estimated the avoided emissions of this low-carbon product(s) or service(s)

Yes

Methodology used to calculate avoided emissions

Estimating and Reporting the Comparative Emissions Impacts of Products (WRI)

Life cycle stage(s) covered for the low-carbon product(s) or services(s)

Use stage

Functional unit used

energy consumption intensity in operating assets vs. average IOGP energy consumption intensity for oil and gas sector.

Reference product/service or baseline scenario used

average IOGP energy consumption.

Life cycle stage(s) covered for the reference product/service or baseline scenario

Use stage

Estimated avoided emissions (metric tons CO₂e per functional unit) compared to reference product/service or baseline scenario

124,860

Explain your calculation of avoided emissions, including any assumptions

Avoided emission was calculated by differentiation between asset emission and average IOGP emission. Revenue was calculated by counted assets revenue from low carbon product divided by PTTEP total revenue.

Revenue generated from low-carbon product(s) or service(s) as % of total revenue in the reporting year

60

C-OG4.6

(C-OG4.6) Describe your organization's efforts to reduce methane emissions from your activities.

Since 2013, PTTEP has developed and continued our own methane leak detection and repairing program for both onshore and offshore operating assets in Thailand, Myanmar and Malaysia. The result from this program support us on reporting the fugitive by approach of direct measurement at leak point. In 2021, PTTEP developed methane emission reduction roadmap with target to achieve 1st quartile of IOGP.

In 2015, PTTEP, through our parent company PTT Group, participates in the CCAC Oil & Gas Methane Partnership. The CCAC Oil & Gas Methane Partnership is designed to help participating oil & gas companies better understand and systematically manage their methane emissions – and to help them demonstrate their systematic management to stakeholders. It is the result of an extensive consultation with oil and gas companies and industry groups, institutional investors and NGOs. The aim was to create a mechanism robust enough to meet the needs of stakeholders and implementable by companies. PTTEP has participated in a task force to develop and review the Technical Guidance Document on methane emissions reduction.

In 2016, PTTEP in collaboration with TGO developed methods to reduce GHG for Methane Leak Detection and Repairing in Petroleum Processing and Distribution Systems. These procedures are not only helpful to PTTEP but can be used by other agencies.

In 2017, PTTEP developed the methane survey guideline to support the operations on methane self-monitoring and emission reduction.

C-OG4.7

(C-OG4.7) Does your organization conduct leak detection and repair (LDAR) or use other methods to find and fix fugitive methane emissions from oil and gas production activities?

Yes

C-OG4.7a

(C-OG4.7a) Describe the protocol through which methane leak detection and repair or other leak detection methods, are conducted for oil and gas production activities, including predominant frequency of inspections, estimates of assets covered, and methodologies employed.

Since 2013, PTTEP has developed and continued our own methane leak detection and repairing program for both onshore and offshore operating assets in Thailand, Myanmar and Malaysia. The methane leak mitigation and action plan is developed for each assets to reduce methane emission. In 2017, PTTEP developed the methane survey guideline to support the operations on methane self-monitoring and emission reduction. The methane survey approach is under the Loss of Primary Containment (LOPC) Reporting and Reduction which is an integral part of PTTEP SSHE and Process Safety management system. It has been developed based on the United States Environmental Protection Agency (US EPA) Method 21 and US EPA Leak Detection and Repair (LDAR) program (EPA-305-D-07-001, Leak Detection and Repair – A Best Practices Guide, United States Environmental Protection Agency (US EPA), October 2007).

The guideline was initially applied in 2018 at our offshore operations and has been continued annually. Since 2013 the methane surveys have been conducted at all operation assets. From 7 operation assets, 98 wellhead platforms/wellsites were surveyed with 644 leak points detected and leak reduction of approximately 14,740 tonneCO₂e/year after fixed. The surveys were internally conducted by PTTEP staffs and aimed to improve our fugitive emission reporting and reduce the methane emissions.

Outcomes from the survey allow the unintentional leaks to be detected and fixed, which subsequently enhances process safety, increases productions from the recovered gases, and ultimately enables to evaluate the current status of PTTEP GHG emissions and comes up with any means of mitigation accordingly. This approach applies to all projects under PTTEP operational control. To ensure that the emission reduction performance is maintained, it is suggested that the leak survey should be conducted regularly. The more frequent the survey conducted, the better the reduction performance is ensured. Normally, the survey frequency should be conducted at least, but not limited to, as follows: For routine maintenance by assets:

- After there is any significant change made to the equipment/component
- After major/minor shutdown or maintenance activities
- As per site's requirement or maintenance programs

For re-monitoring the GHG reduction:

- At the interval of three years for each location
- If the survey for routine maintenance and for re-monitoring the GHG reduction performance are scheduled for the same period, the survey can be combined together to avoid overconsuming both manpower and resources.

C-OG4.8

(C-OG4.8) If flaring is relevant to your oil and gas production activities, describe your organization's efforts to reduce flaring, including any flaring reduction targets.

PTTEP GHG medium term target was set 25% emission intensity reduction by 2030 from 2012 base year covering all operating assets under PTTEP operational control. GHG emission performance included in the target covers all sources of GHG emission, i.e. flaring, fuel combustion, and fugitives and process vents. GHG reduction initiatives has been voluntarily developed and implemented for achieving the target as planned.

As flare is a major contribution on PTTEP scope 1+2 GHG emission (approximately 55%), the GHG reduction target on a yearly basis which focus on flaring reduction as follows:

- Flash Gas Recovery Unit (FGRU) at Greater Bongkot South: The project was implemented since 2013. In 2021, target to reduce GHG from this project is 110,000 tonneCO₂e. PTTEP was able to recover flash gas from condensate production in Greater Bongkot South accounting for 1,235 MMSCF per year which is equivalent to a flare reduction of approximately 123,547 tCO₂e per year
- Flare gas utilisation at Sirikit Oil Field: The project was implemented since 2013. The excess gas from the petroleum production process was utilized by selling to UAC Global Public Co., Ltd. for electricity production. In 2021, target to reduce GHG from this project is 13,500 tonneCO₂e and PTTEP was able to reduce flare 28,316 tCO₂e per year.
- Trunk flow line from remote station of Sirikit Oil Field: Trunk flow line project aims to reduce flaring at remote station of Sirikit Oil field by transporting excess gas through pipelines to be consolidated and reused at the main production facilities. The project started to operate in the 4th quarter of 2016. In 2021, target to reduce GHG from this project is 23,800 tonneCO₂e and estimated flare reduction was at 18,939 tCO₂e per year.
- LP Flare Recovery at Sirikit Oil Field: The low pressure excess gas from the petroleum production process was recovered by gas ejector to return gas which otherwise be flared at low pressure flare to production process. The project started to operate in the 3rd quarter of 2018. In 2021, target to reduce GHG from this project is 3,000 tonneCO₂e and estimated flare reduction was of 3,257 tCO₂e per year.
- Flare Purge Gas Reduction at Greater Bongkot North: The project was just implemented since 2021. In 2021, target to reduce GHG from this project is 0 tonneCO₂e. PTTEP was able to reduced flare approximately 4,716 tCO₂e per year
- Stripping Gas Reduction at Greater Bongkot North: The project was just implemented since 2021. In 2021, target to reduce GHG from this project is 0 tonneCO₂e. PTTEP was able to reduced flare approximately 513 tCO₂e per year

Apart from yearly flaring reduction targets in our existing assets above, we also set longer-term target for zero routine flare by 2030 which is aligned with "Zero Routine Flaring by 2030" initiative introduced by the World Bank.

C5. Emissions methodology

C5.1

(C5.1) Is this your first year of reporting emissions data to CDP?

No

C5.1a

(C5.1a) Has your organization undergone any structural changes in the reporting year, or are any previous structural changes being accounted for in this disclosure of emissions data?

Row 1

Has there been a structural change?

No

C5.1b

(C5.1b) Has your emissions accounting methodology, boundary, and/or reporting year definition changed in the reporting year?

	Change(s) in methodology, boundary, and/or reporting year definition?	Details of methodology, boundary, and/or reporting year definition change(s)
Row 1	Yes, a change in methodology	Changes in calculation methodology or improvements in the accuracy of emission factors or activity data for HP and LP flare gas calculation in Greater Bongkot North which has no flare metering as it has been installed for long time and this resulted in a significant impact on the base year emissions data

C5.1c

(C5.1c) Have your organization's base year emissions been recalculated as result of the changes or errors reported in C5.1a and C5.1b?

Base year recalculation	Base year emissions recalculation policy, including significance threshold
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Row 1	Yes	<p>Our base year emissions recalculation policy stated the requirement for any of below changes:</p> <ol style="list-style-type: none"> 1. Structural changes in the reporting organization that have a significant impact on the company's base year emissions. A structural change involves the transfer of ownership or control of emissions-generating activities or operations from one company to another. While a single structural change might not have a significant impact on the base year emissions, the cumulative effect of a number of minor structural changes can result in a significant impact. Structural changes include: <ul style="list-style-type: none"> • Mergers, acquisitions, and divestments • Outsourcing and insourcing of emitting activities 2. Changes in calculation methodology or improvements in the accuracy of emission factors or activity data that result in a significant impact on the base year emissions data 3. Discovery of significant errors, or a number of cumulative errors, that are collectively significant <p>Definition of significance threshold refers to any changes at least 5% comparing to total emissions.</p>
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C5.2

(C5.2) Provide your base year and base year emissions.

Scope 1

Base year start

January 1, 2012

Base year end

December 31, 2012

Base year emissions (metric tons CO2e)

5,759,486

Comment

Changes in calculation methodology or improvements in the accuracy of emission factors or activity data for HP and LP flare gas calculation in Greater Bongkot North which has no flare metering as it has been installed for long time and this resulted in a significant impact on the base year emissions data

Scope 2 (location-based)

Base year start

January 1, 2012

Base year end

December 31, 2012

Base year emissions (metric tons CO₂e)

10,935

Comment

No change in scope 2 emission in base year.

Scope 2 (market-based)

Base year start

Base year end

Base year emissions (metric tons CO₂e)

Comment

Scope 3 category 1: Purchased goods and services

Base year start

Base year end

Base year emissions (metric tons CO₂e)

Comment

Scope 3 category 2: Capital goods

Base year start

Base year end

Base year emissions (metric tons CO₂e)

Comment

Scope 3 category 3: Fuel-and-energy-related activities (not included in Scope 1 or 2)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3 category 4: Upstream transportation and distribution

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3 category 5: Waste generated in operations

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3 category 6: Business travel

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3 category 7: Employee commuting

Base year start

Base year end

Base year emissions (metric tons CO₂e)

Comment

Scope 3 category 8: Upstream leased assets

Base year start

Base year end

Base year emissions (metric tons CO₂e)

Comment

Scope 3 category 9: Downstream transportation and distribution

Base year start

Base year end

Base year emissions (metric tons CO₂e)

Comment

Scope 3 category 10: Processing of sold products

Base year start

January 1, 2012

Base year end

December 31, 2012

Base year emissions (metric tons CO2e)

4,036,416

Comment

Natural gas is major PTTEP's product (approx 67% by volume) and was sold directly to PTT Gas Separation Plant (GSP) which is our sole customer. Therefore, GHG emissions from processing of PTTEP's natural gas sold is equal to scope 1&2 GHG emissions of PTT GSP (10,921,040 tonneCO2e). However, natural gas from PTTEP is approx. 42% of total PTT GSP feedstock, and 12% of total gas feed will be a feedstock for petrochemical product which considered as non-combustible product. Therefore, only 88% will be combusted and turn into GHG emission thus, the scope 3- processing of sold product accounted equal to $0.42 * 0.88 * 10,921,040 = 4,036,416$ tonneCO2e

Scope 3 category 11: Use of sold products

Base year start

January 1, 2012

Base year end

December 31, 2012

Base year emissions (metric tons CO2e)

30,222,561

Comment

Emissions from natural gas combustion by the end user were calculated under the assumption that all natural gas sold in 2012 with volume of 605,601 MMSCF from our purchase orders was combusted in 2012. GHG emissions from processing of sold product is deducted. Emissions from crude oil are not relevant because it is not combusted directly and must be processed into other products before being used. Emission factor used is referred to IPCC AR4 (IPCC 2006, vol.2, ch.2, p.2.16)

Scope 3 category 12: End of life treatment of sold products

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3 category 13: Downstream leased assets

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3 category 14: Franchises

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3 category 15: Investments

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3: Other (upstream)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3: Other (downstream)

Base year start

Base year end

Base year emissions (metric tons CO₂e)

Comment

C5.3

(C5.3) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.

American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry, 2009

IPCC Guidelines for National Greenhouse Gas Inventories, 2006

IPIECA's Petroleum Industry Guidelines for reporting GHG emissions, 2nd edition, 2011

ISO 14064-1

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO₂e?

Reporting year

Gross global Scope 1 emissions (metric tons CO₂e)

5,147,775

Comment

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We have no operations where we are able to access electricity supplier emission factors or residual emissions factors and are unable to report a Scope 2, market-based figure

Comment

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO₂e?

Reporting year

Scope 2, location-based

13,984

Comment

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

No

C6.5

(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

3

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

1

Please explain

Approx. 3 tCO₂e accounting of the goods and services provided during the event, including emission from cooking, electricity consumption, transportation of equipment and attendees, accommodation, distribution materials and waste from 2021 Annual General Meeting of Shareholders event which was a carbon neutral event.

Capital goods

Evaluation status

Relevant, not yet calculated

Please explain

Emission information for capital goods such as machinery and equipment are not yet available, however, we considered the emission from this categories is insignificant (less than 5%) comparing to our total scope 3 emissions from the use of sold product and processing of sold product.

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

814

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Latest data for electric power transmission and distribution losses was 6 % of output for Thailand, 20% of output for Myanmar and 6% of output for Malaysia (data is from <https://data.worldbank.org/indicator/eg.elc.loss.zs>). Emissions from scope 2 were 7,467 tCO₂e for Thailand, 70 tCO₂e for Myanmar, and 5,487 tCO₂e for Malaysia, total emissions before transmission and distribution loss would have been 7,915 tCO₂e for Thailand, 84 tCO₂e for Myanmar, and 5,816 tCO₂e for Malaysia.

6% of 7,467 tCO₂e is 448 tCO₂e, 20% of 84 tCO₂e is 17 tCO₂e, and 6% of 5,816 tCO₂e is 349 tCO₂e, then totally = 814 tCO₂e for transmission and distribution loss.

Upstream transportation and distribution

Evaluation status

Relevant, not yet calculated

Please explain

Referring "Overview of methodologies: Estimating petroleum industry value chain (Scope 3) greenhouse gas emissions" of IPIECA and API, the category emissions comparison also requires considering volume, for example if the amount of fuel used in a category is smaller than the amount of that fuel sold by the company included in Category 11 (Use of sold products), the company may assume that accounting for fuel emissions in both Category 11 and the other category may be double counting. Categories for which it may be straightforward to avoid the double counting of Category 11 (Use of sold products) emissions include Category 4 (upstream transport and distribution), Category 6 (business travel) and Category 7 (employee commuting). Accordingly, PTTEP considered that the emissions from fuel that company sold are cover the emissions from the fuel used in Category 4 (upstream transport and distribution) and Category 7 and we choose to disclose under Category 11 (Use of sold products) emissions.

Waste generated in operations

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

8,127

Emissions calculation methodology

Waste-type-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Apart from reuse and recycle methods, PTTEP's waste is mainly disposed in two ways: incineration (which is alternatively burning in cement kiln) and landfill (mostly are domestic non-hazardous waste). By using emission factor for industrial waste for these two disposal methods, we estimated the Scope 3 emissions from waste generation.

The GHG emission factor from incineration = 1.0 tonneCO₂e output/tonne waste (referred: Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, IPCC). In 2021, waste disposed by incineration = 7,297 tonne, thus generated GHG = 7,297 tCO₂e.

The GHG emission factor from landfill = 0.8 tonneCO₂e output/tonne waste (referred: <https://www.anamai.moph.go.th>). In 2021, waste disposed by landfill= 830 tonne, thus generated GHG = 830 tCO₂e.

Therefore, total GHG emission from waste generated in operations= 8,127 tCO₂e.

Business travel

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

3,632

Emissions calculation methodology

Fuel-based method

Distance-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

The GHG emissions from business travel was calculated by tracking on the distance travelled by employees segregated by cabin class and flight classification by short haul or long haul then applied the emission factors which refers to the PTT Group standard for GHG reporting and GWP factors refer IPCC AR4.

Employee commuting

Evaluation status

Relevant, not yet calculated

Please explain

Referring "Overview of methodologies: Estimating petroleum industry value chain (Scope 3) greenhouse gas emissions" of IPIECA and API, the category emissions comparison also requires considering volume, for example if the amount of fuel used in a category is smaller than the amount of that fuel sold by the company included in Category 11 (Use of sold products), the company may assume that accounting for fuel emissions in both Category 11 and the other category may be double counting. Categories for which it may be straightforward to avoid the double counting of Category 11 (Use of sold products) emissions include Category 4 (upstream transport and distribution), Category 6 (business travel) and Category 7 (employee commuting). Accordingly, PTTEP considered that the emissions from fuel that company sold are cover the emissions from the fuel used in Category 4 (upstream transport and distribution) and Category 7 and we choose to disclose under Category 11 (Use of sold products) emissions.

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Please explain

PTTEP leases upstream assets, i.e. helicopter, heavy truck, marine vessel, are already included in scope 1 since their activities are under PTTEP operational control.

Downstream transportation and distribution

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

5,870

Emissions calculation methodology

Fuel-based method

Distance-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

The GHG emissions from Downstream transportation and distribution was calculated by tracking on vehicle mileage (segregated by vehicle type and fuel type) and fuel use data separated by fuel type, then applied the emission factors which refers to the PTT Group standard for GHG reporting & API Compendium 2009 and GWP factors refer IPCC AR4.

Processing of sold products

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

4,036,416

Emissions calculation methodology

Site-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Natural gas is major PTTEP's product (approx 67% by volume) and was sold directly to PTT Gas Separation Plant (GSP) which is our sole customer. Therefore, GHG emissions from processing of PTTEP's natural gas sold is equal to scope 1&2 GHG emissions of PTT GSP (10,921,040 tonneCO₂e). However, natural gas from PTTEP is approx. 42% of total PTT GSP feedstock, and 12% of total gas feed will be a feedstock for petrochemical product which considered as non-combustible product. Therefore, only 88% will be combusted and turn into GHG emission thus, the scope 3- processing of sold product accounted equal to $0.42 * 0.88 * 10,921,040 = 4,036,416$ tonneCO₂e

Use of sold products

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

33,311,885

Emissions calculation methodology

Methodology for direct use phase emissions, please specify
use-phase emissions are calculated by multiplying the quantities of fuels/
feedstocks by the combustion emission factors for the fuels/feedstocks.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Emissions from natural gas combustion by the end user were calculated under the assumption that all natural gas sold in 2021 with volume of 667,505 MMSCF from our purchase orders was combusted in 2021. Emissions from crude oil are not relevant because it is not combusted directly and must be processed into other products before being used. Emission factor used is referred to IPCC AR4 (IPCC 2006, vol.2, ch.2, p.2.16)

End of life treatment of sold products

Evaluation status

Not relevant, explanation provided

Please explain

PTTEP's products are crude oil, natural gas and condensate as business to business nature. We do not sell our product to the mass consumers. These products generally do not end up as waste since they are fuels or are used to produce fuels, therefore there is no end of life treatment for our products.

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Please explain

PTTEP does not have any downstream leased assets.

Franchises

Evaluation status

Not relevant, explanation provided

Please explain

PTTEP engages in only exploration and production without downstream business. PTTEP therefore does not have any franchises as defined in the GHG Scope 3 Accounting and Reporting Standard.

Investments

Evaluation status

Not relevant, explanation provided

Please explain

PTTEP engages in only exploration and production (upstream) without midstream and downstream business and does not provide any financial services. Therefore, this issue is not applicable to our current business model.

Other (upstream)

Evaluation status

Not relevant, explanation provided

Please explain

All relevant scope 3 emission had been identified in each category above.

Other (downstream)

Evaluation status

Not relevant, explanation provided

Please explain

All relevant scope 3 emission had been identified in each category above.

C6.7

(C6.7) Are carbon dioxide emissions from biogenic carbon relevant to your organization?

Yes

C6.7a

(C6.7a) Provide the emissions from biogenic carbon relevant to your organization in metric tons CO2.

	CO2 emissions from biogenic carbon (metric tons CO2)	Comment
Row 1	2,084	Biogenic carbon dioxide emissions is from the combustion or decomposition of biologically-based materials other than fossil fuels e.g, bio diesel (B5, B7, B10) used in PTTEP operations.

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO₂e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0.000706

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO₂e)

5,161,758

Metric denominator

unit total revenue

Metric denominator: Unit total

7,314,225,000

Scope 2 figure used

Location-based

% change from previous year

70

Direction of change

Decreased

Reason for change

The reasons for change are from:

1. The increase in the unit total revenue due to the higher gas & oil price as a result of lower supply from war.
2. The decrease in the total GHG emission as a result of an our significant success in GHG emissions initiatives.

C-OG6.12

(C-OG6.12) Provide the intensity figures for Scope 1 emissions (metric tons CO₂e) per unit of hydrocarbon category.

Unit of hydrocarbon category (denominator)

Other, please specify

Thousand tonne of Production

Metric tons CO₂e from hydrocarbon category per unit specified

223.1

% change from previous year

14

Direction of change

Decreased

Reason for change

In 2021, we have increased production from newly operating block in Malaysia which is much lower in GHG emission intensity.

Comment

C-OG6.13

(C-OG6.13) Report your methane emissions as percentages of natural gas and hydrocarbon production or throughput.

Oil and gas business division

Upstream

Estimated total methane emitted expressed as % of natural gas production or throughput at given division

0.07

Estimated total methane emitted expressed as % of total hydrocarbon production or throughput at given division

0.055

Comment

As an upstream oil and gas business, our methane emission is mainly from incomplete combustion of flaring and fuel combustion and process & vent.

Note: % above expressed in term of tonne CH₄ per tonne Production.

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	4,823,528	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	318,955	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	3,063	IPCC Fourth Assessment Report (AR4 - 100 year)
Other, please specify Mixture of HFCs, PFCs, CFCs	2,229	IPCC Fourth Assessment Report (AR4 - 100 year)

C-OG7.1b

(C-OG7.1b) Break down your total gross global Scope 1 emissions from oil and gas value chain production activities by greenhouse gas type.

Emissions category

Flaring

Value chain

Upstream

Product

Unable to disaggregate

Gross Scope 1 CO2 emissions (metric tons CO2)

2,753,370

Gross Scope 1 methane emissions (metric tons CH4)

5,746

Total gross Scope 1 emissions (metric tons CO2e)

2,897,038

Comment

Emissions category

Combustion (excluding flaring)

Value chain

Upstream

Product

Gross Scope 1 CO2 emissions (metric tons CO2)

2,051,568

Gross Scope 1 methane emissions (metric tons CH4)

13

Total gross Scope 1 emissions (metric tons CO2e)

2,054,951

Comment

Emissions category

Fugitives

Value chain

Upstream

Product

Unable to disaggregate

Gross Scope 1 CO2 emissions (metric tons CO2)

5,525

Gross Scope 1 methane emissions (metric tons CH4)

6,492.74

Total gross Scope 1 emissions (metric tons CO2e)

187,739

Comment

Emissions category

Venting

Value chain

Upstream

Product

Unable to disaggregate

Gross Scope 1 CO2 emissions (metric tons CO2)

41

Gross Scope 1 methane emissions (metric tons CH4)

413

Total gross Scope 1 emissions (metric tons CO2e)

10,368

Comment

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO2e)
Thailand	4,027,140
Myanmar	201,689
Malaysia	918,947

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By facility

By activity

C7.3b

(C7.3b) Break down your total gross global Scope 1 emissions by business facility.

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
GBN	672,966	7.89501	102.4656
GBS	2,142,218	7.65743	102.680852
ART	689,531	8.24169	102.47739
S1 & L22/43	473,256	16.80199	99.95117
Suphanburi	1,807	14.33893	99.97073
Sinphuhorm (SPH)	47,303	16.677019	102.771435
PSB	46	7.23497	100.56158
RSB	12	10.030612	98.633312
Zawtika	201,689	14.190867	96.045583
Malaysia	918,947	3.267361	113.077972

C7.3c

(C7.3c) Break down your total gross global Scope 1 emissions by business activity.

Activity	Scope 1 emissions (metric tons CO2e)
Flare	2,897,038
Stationary Combustion	1,869,627
Mobile Combustion	185,325
Process and Vent Emission	10,368
Fugitive Emission from Facilities	183,606
Fugitive of SF6,HFC,PFC,Mixture	1,811

C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4

(C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4) Break down your organization's total gross global Scope 1 emissions by sector production activity in metric tons CO2e.

	Gross Scope 1 emissions, metric tons CO2e	Comment
Oil and gas production activities (upstream)	5,147,775	The Gross Scope 1 emission presented is excluded the GHG emission from transportation of personnel and transportation of materials from supplier to industrial sector boundary.
Oil and gas production activities (midstream)	0	PTTEP is categorized as upstream oil & gas company and no activities related to midstream.
Oil and gas production activities (downstream)	0	PTTEP is categorized as upstream oil & gas company and no activities related to downstream.

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Thailand	8,426	0
Myanmar	70	0
Malaysia	5,487	0

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By facility

By activity

C7.6b

(C7.6b) Break down your total gross global Scope 2 emissions by business facility.

Facility	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
S1 & L 22/43	4,846	0
Suphanburi	2,126	0
SPH	879	0
PSB	443	0
RSB	90	0
ART	0	0
GBN	0	0
GBS	0	0
Malaysia	5,487	0
Zawtika	70	0

C7.6c

(C7.6c) Break down your total gross global Scope 2 emissions by business activity.

Activity	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Electricity Purchased	13,984	0
Stream Purchased	0	0

C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7

(C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7) Break down your organization's total gross global Scope 2 emissions by sector production activity in metric tons CO2e.

	Scope 2, location-based, metric tons CO2e	Scope 2, market-based (if applicable), metric tons CO2e	Comment
Oil and gas production activities (upstream)	13,984	0	The scope 2 GHG from our operation is just from the purchased electricity for onshore facilities and petroleum support bases only. The offshore facilities used their own-generated electricity that supplied by our fuel gas.
Oil and gas production activities (midstream)	0	0	PTTEP is categorized as upstream oil & gas company and no activities related to midstream.
Oil and gas production activities (downstream)	0	0	PTTEP is categorized as upstream oil & gas company and no activities related to downstream.

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Decreased

C7.9a

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined), and for each of them specify how your emissions compare to the previous year.

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	118	Decreased	0.002	We have implemented the renewable energy e.g. solar roof top for petroleum support base, wind-solar power for offshore wellhead platform.
Other emissions reduction activities	511,390	Decreased	13.046	In 2021, we achieved the GHG reduction volume more than planned and also have additional implementation of emissions reduction activities included the flare purge gas and stripping gas reduction . More

				details of these projects can be found in C4.3b.
Divestment	0	No change	0	No divestment in 2021.
Acquisitions	0	No change	0	No acquisition in 2021.
Mergers	0	No change	0	No merger in 2021.
Change in output	566,773	Increased	10.494	In 2021, the production significantly increased. If without the success in GHG reduction, the GHG emissions would be expected to increase significantly.
Change in methodology	2,321	Decreased	0.043	In 2021, we improved the methodology for flare gas calculation for Greater Bongkot North asset and resulted in lower GHG emissions from HP/LP flare.
Change in boundary	0	No change	0	No changed in boundary.
Change in physical operating conditions	0	No change	0	No change in physical operating conditions
Unidentified	0	No change	0	Reasons of all changes had been identified.
Other	511,390	Decreased	13.046	The other reasons are related to e.g. more productions from block H in Malaysia without further gas processing under our operational control, our effort to produce with lower gas flared to ensure compliance with the flare gas limits by government.

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 0% but less than or equal to 5%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertook this energy-related activity in the reporting year
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	No
Generation of electricity, heat, steam, or cooling	Yes

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	Unable to confirm heating value	11,935	9,112,355	9,124,290
Consumption of purchased or acquired electricity		0	93,445	93,445

Consumption of self-generated non-fuel renewable energy		424		424
Total energy consumption		12,359	9,205,800	9,218,159

C8.2b

(C8.2b) Select the applications of your organization’s consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	No
Consumption of fuel for the generation of cooling	No
Consumption of fuel for co-generation or tri-generation	No

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Sustainable biomass

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

11,935

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Sustainable biomass that we consumed is sourced from biodiesel as composition in our diesel consumption for marine and land transportation.

Other biomass

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

We don't use energy sourced from other biomass.

Other renewable fuels (e.g. renewable hydrogen)

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

All renewable fuels have already been identified in specific categories .

Coal

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

We don't use energy sourced from coal.

Oil

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

634,509

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Oil consumption in our operation is from non-renewable diesel and gasoline for marine & land transportation, and Jet A1 for air transportation.

Gas

Heating value

LHV

Total fuel MWh consumed by the organization

8,477,846

MWh fuel consumed for self-generation of electricity

1,295,030

MWh fuel consumed for self-generation of heat

685,604

Comment

Natural Gas consumed at all assets is "LHV (lower heating value)", except SPH where "HHV (higher heating value)" is applied.

Referring our EEI study in 2013, approximately 17% (with range of 5-44%) of our fuel gas was used for electricity generation and 9% (with range of 0-12.3%) was used for heat generation. Then the figures above was calculated based on this study.

Other non-renewable fuels (e.g. non-renewable hydrogen)

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

Comment

Total fuel

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

9,124,290

MWh fuel consumed for self-generation of electricity

1,441,234

MWh fuel consumed for self-generation of heat

763,006

Comment

C8.2d

(C8.2d) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	1,441,658	1,441,658	424	424
Heat	763,006	763,006	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C8.2g

(C8.2g) Provide a breakdown of your non-fuel energy consumption by country.

Country/area

Thailand

Consumption of electricity (MWh)

894,141

Consumption of heat, steam, and cooling (MWh)

473,369

Total non-fuel energy consumption (MWh) [Auto-calculated]

1,367,510

Country/area

Malaysia

Consumption of electricity (MWh)

226,419

Consumption of heat, steam, and cooling (MWh)

119,869

Total non-fuel energy consumption (MWh) [Auto-calculated]

346,288

Country/area

Myanmar

Consumption of electricity (MWh)

174,470

Consumption of heat, steam, and cooling (MWh)

92,366

Total non-fuel energy consumption (MWh) [Auto-calculated]

266,836

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

C-OG9.2a

(C-OG9.2a) Disclose your net liquid and gas hydrocarbon production (total of subsidiaries and equity-accounted entities).

	In-year net production	Comment

Crude oil and condensate, million barrels	33.88	-
Natural gas liquids, million barrels	0	No natural gas liquids production.
Oil sands, million barrels (includes bitumen and synthetic crude)	0	No oil sands production.
Natural gas, billion cubic feet	760.14	-

C-OG9.2b

(C-OG9.2b) Explain which listing requirements or other methodologies you use to report reserves data. If your organization cannot provide data due to legal restrictions on reporting reserves figures in certain countries, please explain this.

PTTEP defines Proved Reserves are those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations. Practically, Proved Reserves mean the petroleum in reservoirs which can be commercially produced based on supporting data gathered during the well testing process. The Company's Proved Reserves are reviewed annually by our earth scientists and reservoir engineers to ensure the industry's rigorous professional standards.

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

Due to the company policy, PTTEP publicly reports only Proved and Probable reserves.

C-OG9.2c

(C-OG9.2c) Disclose your estimated total net reserves and resource base (million boe), including the total associated with subsidiaries and equity-accounted entities.

	Estimated total net proved + probable reserves (2P) (million BOE)	Estimated total net proved + probable + possible reserves (3P) (million BOE)	Estimated net total resource base (million BOE)	Comment
Row 1	2,123		2,123	Estimated net total resource base is just from P1 = 1350 MMBOE, P2 = 773 MMBOE (we did not disclose on P3.

C-OG9.2d

(C-OG9.2d) Provide an indicative percentage split for 2P, 3P reserves, and total resource base by hydrocarbon categories.

	Net proved + probable reserves (2P) (%)	Net proved + probable + possible reserves (3P) (%)	Net total resource base (%)	Comment
Crude oil/ condensate/ natural gas liquids	30		30	Due to the company policy, PTTEP publicly discloses only Proved (P1) and Probable(P2) reserves.
Natural gas	70		70	Due to the company policy, PTTEP publicly discloses only Proved (P1) and Probable(P2) reserves.
Oil sands (includes bitumen and synthetic crude)	0		0	Due to the company policy, PTTEP publicly discloses only Proved (P1) and Probable(P2) reserves.

C-OG9.2e

(C-OG9.2e) Provide an indicative percentage split for production, 1P, 2P, 3P reserves, and total resource base by development types.

Development type

Onshore

In-year net production (%)

23

Net proved reserves (1P) (%)

31

Net proved + probable reserves (2P) (%)

35

Net proved + probable + possible reserves (3P) (%)

Net total resource base (%)

Comment

Due to the company policy, PTTEP publicly discloses only Proved (P1) and Probable(P2) reserves.

Development type

Shallow-water

In-year net production (%)

77

Net proved reserves (1P) (%)

69

Net proved + probable reserves (2P) (%)

65

Net proved + probable + possible reserves (3P) (%)

Net total resource base (%)

Comment

Due to the company policy, PTTEP publicly discloses only Proved (P1) and Probable(P2) reserves.

C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6

(C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6) Does your organization invest in research and development (R&D) of low-carbon products or services related to your sector activities?

	Investment in low-carbon R&D	Comment
Row 1	Yes	

C-CO9.6a/C-EU9.6a/C-OG9.6a

(C-CO9.6a/C-EU9.6a/C-OG9.6a) Provide details of your organization's investments in low-carbon R&D for your sector activities over the last three years.

Technology area	Stage of development in the reporting year	Average % of total R&D investment over the last 3 years	R&D investment figure in the reporting year (optional)	Comment
Carbon capture and storage/utilisation	Large scale commercial deployment	≤20%		PTTEP has set up the technology development strategy to support company sustainable development strategy for being low carbon

				<p>organization. The strategy focused in 3 areas: enhance core E&P business, minimize environmental impact and explore future energy transition. To support our medium term target and ultimate goal for net zero GHG emission in long term, PTTEP is developing technologies to create high value products from flare or associated gas as well as setting the plan to deploy the CCS technologies in our operations and services. The project stage is under ongoing CCS Pre-FEED at Arthit and oversea asset.</p>
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C-OG9.7

(C-OG9.7) Disclose the breakeven price (US\$/BOE) required for cash neutrality during the reporting year, i.e. where cash flow from operations covers CAPEX and dividends paid/ share buybacks.

28.52

C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	Third-party verification or assurance process in place

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements.

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

 20220311AssuranceStatement-01EN.pdf

Page/ section reference

page 1-2

Relevant standard

ISAE 3410

Proportion of reported emissions verified (%)

100

C10.1b

(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 2 emissions and attach the relevant statements.

Scope 2 approach

Scope 2 location-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

 20220311AssuranceStatement-01EN.pdf

Page/ section reference

page 1-2

Relevant standard

ISAE 3410

Proportion of reported emissions verified (%)

100

C10.1c

(C10.1c) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.

Scope 3 category

Scope 3: Business travel

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

 20220311AssuranceStatement-01EN.pdf

Page/section reference

page 1-2

Relevant standard

ISAE 3410

Proportion of reported emissions verified (%)

100

Scope 3 category

Scope 3: Downstream transportation and distribution

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

 20220311AssuranceStatement-01EN.pdf

Page/section reference

page 1-2.

Relevant standard

ISAE 3410

Proportion of reported emissions verified (%)

100

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

No, but we are actively considering verifying within the next two years

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

No, but we anticipate being regulated in the next three years

C11.1d

(C11.1d) What is your strategy for complying with the systems you are regulated by or anticipate being regulated by?

With reference to Petronas Exploration & Production Minimum Environmental Specifications (MES) endorsed since Oct 2019, it is required all Petroleum Arrangement Contractors operating in Malaysia managing their environmental aspects with regards to upstream petroleum operations and activities to ensure that they are carried out prudently and effectively in line with the best practices currently prevalent in the oil and gas industry. It is clearly stated in MES that carbon price of USD 20/ tCO₂e shall be considered in project decision-making for all development projects in Malaysia. This is an approach Malaysia government bodies implemented to ensure its achievement of net zero emissions in target year of 2050. It is anticipated that the regulatory carbon pricing system will be escalated and implemented in near future. PTTEP, as one of Petroleum Arrangement Contractors in Malaysia, has considered this as a climate related risk and has set up the strategy by incorporating Malaysian CO₂ reduction aspiration into our project design and investment analysis. Consequently, CCS is under our project design study for CO₂ sequestration.

C11.2

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

Yes

C11.2a

(C11.2a) Provide details of the project-based carbon credits originated or purchased by your organization in the reporting period.

Credit origination or credit purchase

Credit purchase

Project type

CO2 usage

Project identification

Carbon credits from CO2 Recovery Plant for Sodium Bicarbonate Production by Genius Integrated Solutions Co., Ltd. to be offset for 2021 Annual General Meeting of Shareholders .

Verified to which standard

Other, please specify

T-VER Project of Thailand Greenhouse Gas Management Organization (Public Organization)

Number of credits (metric tonnes CO2e)

3

Number of credits (metric tonnes CO2e): Risk adjusted volume

3

Credits cancelled

No

Purpose, e.g. compliance

Voluntary Offsetting

Credit origination or credit purchase

Credit origination

Project type

Solar

Project identification

Installation of the solar panels at the rooftops of the office buildings of the petroleum support base since 2018 to supply power to the buildings.

Verified to which standard

Other, please specify

T-VER Project of Thailand Greenhouse Gas Management Organization (Public Organization)

Number of credits (metric tonnes CO₂e)

95.6

Number of credits (metric tonnes CO₂e): Risk adjusted volume

95.6

Credits cancelled

No

Purpose, e.g. compliance

Voluntary Offsetting

C11.3

(C11.3) Does your organization use an internal price on carbon?

Yes

C11.3a

(C11.3a) Provide details of how your organization uses an internal price on carbon.

Objective for implementing an internal carbon price

Navigate GHG regulations
Stakeholder expectations
Change internal behavior
Drive energy efficiency
Drive low-carbon investment
Stress test investments
Identify and seize low-carbon opportunities

GHG Scope

Scope 1
Scope 2

Application

Corporate structure price is applied to increase the project economic viability for all assets located in Thailand, Myanmar and Malaysia. The carbon price will be factored into investment decisions making, especially in projects with potential to generate a

significant amount of GHG, such as bidding for petroleum concessions and assessment of GHG emission reduction projects with using carbon price of USD 20 per tonne of CO2 equivalent. Moreover, the Petronas Exploration & Production Minimum Environmental Specifications (MES) also require oil & gas projects developed in Malaysia to consider carbon price of USD 20 per tonne of CO2 equivalent in project decision-making.

Actual price(s) used (Currency /metric ton)

20

Variance of price(s) used

a single price that is applied throughout the company independent of geography, business unit, or type of decision.

Type of internal carbon price

Shadow price

Impact & implication

With the applied shadow price, it makes our GHG reduction projects economic feasible and mitigates risk from carbon price by regulations in future.

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers

Yes, our customers/clients

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Engagement & incentivization (changing supplier behavior)

Details of engagement

Climate change performance is featured in supplier awards scheme

Other, please specify

Included climate-related management in supplier selection / management mechanism

% of suppliers by number

8

% total procurement spend (direct and indirect)

45

% of supplier-related Scope 3 emissions as reported in C6.5

90

Rationale for the coverage of your engagement

Since 2017, PTTEP has developed and implemented the Green Procurement Criteria Manual covered the goods and services that still not being included in Thai Green Label Products list and PTTEP has significant proportion of spent on that goods or services. Since 2019, PTTEP's green procurement guideline is developed with the objective to elaborate of roles and responsibilities as a responsible and prudent operator by considering beyond private cost-benefit and approach to maximize net benefit of the wider environment. This is to promote procurement of environmentally friendly goods and services, seek the opportunity to reduce environmental impact throughout their life cycle by integrating environmental performance considerations in PTTEP's procurement process. This manual focuses on how to integrate green criteria into procurement and contract processes which can be applied to all related functions in corporate and Thailand assets.

In 2021, 8% of suppliers (engaged with suppliers in priority with spent volume) applied the manual and it could enhance PTTEP consumption in green products or services supply.

Impact of engagement, including measures of success

PTTEP has set target 30% of total spent on office supplies to be green products and services by 2022. Up to 2021, we achieved 45% of total procurement spend under 13 work categories. This target has been annually monitored by responsible party and reported to relevant top management. In additional the achievement of the engagement measures in term of number of suppliers implemented the manual and % of total procurement spend in green products/services.

Comment

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement & Details of engagement

Collaboration & innovation

Other, please specify

Taskforce establishment in collaboration with customer to develop climate change related policy & strategy.

% of customers by number

100

% of customer - related Scope 3 emissions as reported in C6.5

100

Please explain the rationale for selecting this group of customers and scope of engagement

As natural gas is major PTTEP's product (More than 70% by volume) and was sold directly to PTT Gas Separation Plant (GSP) which is our sole customer. The processing of our sold products by the GSP is contributed as a significant stage of GHG scope 3 emission. The engagement with our sole customer is implemented via an establishment of the Environmental taskforce in collaboration with customer to develop climate change related policy & strategy.

Impact of engagement, including measures of success

With the systematic engagement i.e quarterly meeting, carbon pricing policy development and as a result of the collaboration on policy and strategy, PTT Gas Separation Plant (GSP) as a PTT subsidiary set the target of 27% GHG intensity reduction. This target was quarterly monitored. In 2021, PTT GSP has set new target , by 2030, to reduce GHG emissions at least 15% from 2020 baseline. The measures of success is tracked quarterly basis through the PTTG environmental taskforce and PTTG management committee.

C12.2

(C12.2) Do your suppliers have to meet climate-related requirements as part of your organization's purchasing process?

Yes, climate-related requirements are included in our supplier contracts

C12.2a

(C12.2a) Provide details of the climate-related requirements that suppliers have to meet as part of your organization's purchasing process and the compliance mechanisms in place.

Climate-related requirement

Implementation of emissions reduction initiatives

Description of this climate related requirement

PTTEP's green procurement guideline is developed with the objective to elaborate of roles and responsibilities as a responsible and prudent operator by considering beyond private cost-benefit and approach to maximize net benefit of the wider environment. This is to promote procurement of environmentally friendly goods and services, seek the opportunity to reduce environmental impact throughout their life cycle by integrating environmental performance considerations in PTTEP's procurement process. This

guideline focuses on how to integrate green criteria into procurement and contract processes which can be applied to all related functions in corporate and Thailand assets. This could enhance PTTEP consumption in green products or services supply.

% suppliers by procurement spend that have to comply with this climate-related requirement

8

% suppliers by procurement spend in compliance with this climate-related requirement

45

Mechanisms for monitoring compliance with this climate-related requirement

Supplier self-assessment

Supplier scorecard or rating

Response to supplier non-compliance with this climate-related requirement

Other, please specify

There is a feedback mechanism to allow the contractor or supplier to improve their performance over the contractual period

C12.3

(C12.3) Does your organization engage in activities that could either directly or indirectly influence policy, law, or regulation that may impact the climate?

Row 1

Direct or indirect engagement that could influence policy, law, or regulation that may impact the climate

Yes, we engage directly with policy makers

Does your organization have a public commitment or position statement to conduct your engagement activities in line with the goals of the Paris Agreement?

Yes

Attach commitment or position statement(s)

1. <https://www.pttep.com/en/Newsandnmedia/Mediacorner/Pressreleases/Pttep-Initiates-Thailand-First-Ccs-Project-Pushing-Towards-Net-Zero-Green-House-Gas-Emissions.aspx>, Bangkok, June 6, 2022
2. <https://www.energyvoice.com/renewables-energy-transition/417477/pttep-to-start-thailands-first-ccs-project-in-2026/>

“Our knowledge and expertise in geoscience and petroleum engineering represent advantageous foundation for CCS development, leading us towards our carbon emissions reduction target. Apart from Thailand’s first CCS initiative at the Arthit gas field, PTTEP has collaborated with partners who have experience in CCS technology in

Japan to evaluate the potential of CCS development in other parts of Thailand that will eventually provide support to other domestic industries in decarbonization. Moreover, we have recently joined forces with companies in PTT Group to apply CCS under the concept of CCS Hub Model to reduce GHG emissions from PTT Group's operations and other industries in the adjacent operational areas. These ongoing projects are expected to effectively support the country's road to net zero GHG reduction goal. However, several key factors including CCS policy and regulations, investment promotion mechanisms, as well as cultivation of knowledge and understanding among the public are needed for the successful execution of the CCS project in Thailand. These will require collective support from government agencies and relevant parties in driving and promoting CCS technology adoption in Thailand in order to ensure that we can truly achieve our emissions reduction goals," said Mr. Montri.

(Statement above and attached file have been disclosed in PTTEP website.)

 PTTEP.pdf

Describe the process(es) your organization has in place to ensure that your engagement activities are consistent with your overall climate change strategy

The in-place process to ensure that our engagement activities are consistent with our overall climate change strategy is to:

- conducted the climate-risk assessment to understand both physical and transition risk in short-, medium- and long-term.
- conduct the materiality assessment through interviews and questionnaires with all stakeholder groups (policy makers is being one of stakeholders)

The results of above then were integrated into the Corporate climate change strategy as public statement on Net Zero GHG target below (ref: <https://www.pttep.com/en/Sustainabledevelopment/Net-Zero-Ghg-Emissions.aspx>) :

"With the spirit and determination towards sustainable growth, PTTEP operates with consideration to create the right balance of business, social and environmental aspects as well as shared values for stakeholders. PTTEP therefore takes part in managing greenhouse gas and solving global warming issues. The effort is in line with the global action on climate change and Thailand's commitment to the UN Climate Change Conference of the Parties (COP26) in Glasgow, where Thailand agreed to reach carbon neutrality in 2050 and Net Zero Greenhouse Gas Emissions in 2065.

We set forth to reach Net Zero Greenhouse Gas Emissions by 2050 with our EP Net Zero 2050 concept. This goal covers both direct emissions (scope 1) and indirect emissions (Scope 2) of the exploration and production business under PTTEP's operational control. PTTEP also has set interim targets to reduce greenhouse gas

emission intensity by at least 30% within 2030 and 50% within 2040 (from base year 2020) and achieve net zero greenhouse gas emissions in 2050.

C12.3a

(C12.3a) On what policy, law, or regulation that may impact the climate has your organization been engaging directly with policy makers in the reporting year?

Focus of policy, law, or regulation that may impact the climate

Adaptation and/or resilience to climate change
Low-carbon, non-renewable energy generation
Renewable energy generation
Subsidies for fossil fuel exploration and/or extraction

Specify the policy, law, or regulation on which your organization is engaging with policy makers

- Subsidy or financial support for CCUS technology implementation
- Renewable energy generation
- Carbon price for business investment decision
- Carbon Tax & Trading Scheme

Policy, law, or regulation geographic coverage

Global

Country/region the policy, law, or regulation applies to

Your organization's position on the policy, law, or regulation

Support with minor exceptions

Description of engagement with policy makers

- Met directly with policymakers from the Department of Mineral Fuels of Thailand & Office of Natural Resources & Environmental Policy and Planning to communicate the commercial benefits, opportunity and risks of CCUS development.
- Met directly with policymakers from the Thailand Greenhouse Gas Management Organization (TGO) to communicate the carbon tax & trading scheme, participated the Thailand Voluntary Emission Reduction Program (T-VER), and attended the public webinars and responded to the consultation on carbon tax & trading schemes .
- Met directly with policymakers from the Malaysia Petroleum Management (MPM), for Climate Action, financial support on the CCS developing project in Malaysia.
- Conference with policymakers from the Japan Oil, Gas and Metals National Corporation (JOGMEC) to communicate the commercial benefits, opportunity and technical support on CCUS development.

Details of exceptions (if applicable) and your organization's proposed alternative approach to the policy, law or regulation

- Carbon price stated in the Minimum Environmental Specifications (MES) from Malaysia Petroleum Management (MPM) to be implemented for business investment decision.

Have you evaluated whether your organization's engagement is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

C12.4

(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).


Publication

In voluntary sustainability report

Status

Complete

Attach the document

 2021SustainabilityReportEN.pdf

Page/Section reference

page 5, 17, 21, 28-31

Content elements

Governance
Strategy
Risks & opportunities
Emission targets

Comment

Publication

In voluntary communications

Status

Complete

Attach the document

 20211231EnvironmentalManagementPerformanceData-01EN.pdf

Page/Section reference

page 1

Content elements

Emissions figures

Comment

C15. Biodiversity

C15.1

(C15.1) Is there board-level oversight and/or executive management-level responsibility for biodiversity-related issues within your organization?

	Board-level oversight and/or executive management-level responsibility for biodiversity-related issues	Description of oversight and objectives relating to biodiversity
Row 1	Yes, both board-level oversight and executive management-level responsibility	Our corporate targets on biodiversity of BES value and No Gross Deforestation were oversight by the BoD, and we have sub board namely Corporate Governance and Sustainable Development Committee to review the performance of sustainability issues including biodiversity as quarterly basis.

C15.2

(C15.2) Has your organization made a public commitment and/or endorsed any initiatives related to biodiversity?

	Indicate whether your organization made a public commitment or endorsed any initiatives related to biodiversity	Biodiversity-related public commitments	Initiatives endorsed
Row 1	Yes, we have made public commitments and publicly endorsed initiatives related to biodiversity	Commitment to Net Positive Gain Commitment to No Net Loss Adoption of the mitigation hierarchy approach Commitment to not explore or develop in legally designated protected areas Other, please specify	

	No gross deforestation	
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C15.3

(C15.3) Does your organization assess the impact of its value chain on biodiversity?

Does your organization assess the impact of its value chain on biodiversity?	
Row 1	Yes, we assess impacts on biodiversity in both our upstream and downstream value chain

C15.4

(C15.4) What actions has your organization taken in the reporting year to progress your biodiversity-related commitments?

	Have you taken any actions in the reporting period to progress your biodiversity-related commitments?	Type of action taken to progress biodiversity-related commitments
Row 1	Yes, we are taking actions to progress our biodiversity-related commitments	Land/water protection Land/water management Species management Education & awareness Law & policy Livelihood, economic & other incentives

C15.5

(C15.5) Does your organization use biodiversity indicators to monitor performance across its activities?

	Does your organization use indicators to monitor biodiversity performance?	Indicators used to monitor biodiversity performance
Row 1	Yes, we use indicators	State and benefit indicators Pressure indicators Response indicators

C15.6

(C15.6) Have you published information about your organization’s response to biodiversity-related issues for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Report type	Content elements	Attach the document and indicate where in the document the relevant biodiversity information is located

In voluntary sustainability report or other voluntary communications	Content of biodiversity-related policies or commitments Governance Risks and opportunities Biodiversity strategy	📎 1
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📎 12021SustainabilityReportEN.pdf

C16. Signoff

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

C16.1

(C16.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	Chief Executive Officer	Chief Executive Officer (CEO)

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	I understand that my response will be shared with all requesting stakeholders	Response permission
Please select your submission options	Yes	Public

Please confirm below

I have read and accept the applicable Terms

