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## Climate Change 2017 - PTT Exploration & Production Public Company Limited

### Module: Introduction

#### Page: Introduction

##### CC0.1

##### Introduction

Please 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 a leading Asian exploration and production company driven by competitive performance, advanced technology and green practices.

In order to shape the behaviour and culture of the company in pursue of our vision, PTTEP's company values, "EP SPIRIT", reflex key success factors and drivers of our business in which PTTEP expects these values to be embedded into every PTTEP individual to generate our corporate DNA of "Passion to Explore with Responsibility".

PTTEP has worldwide operations of 37 projects in 10 countries as of December 2016

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 tank and warehouse management. It owns and operates a gas transportation piping system.

##### CC0.2

##### Reporting Year

Please state the start and end date of the year for which you are reporting data.

The current reporting year is the latest/most recent 12-month period for which data is reported. Enter the dates of this year first.

We request data for more than one reporting period for some emission accounting questions. Please provide data for the three years prior to the current reporting year if you have not provided this information before, or if this is the first time you have answered a CDP information request. (This does not apply if you have been offered and selected the option of answering the shorter questionnaire). If you are going to provide additional years of data, please give the dates of those reporting periods here. Work backwards from the most recent reporting year.

Please enter dates in following format: day(DD)/month(MM)/year(YYYY) (i.e. 31/01/2001).

Enter Periods that will be disclosed

Fri 01 Jan 2016 - Sat 31 Dec 2016

##### CC0.3

##### Country list configuration

Please select the countries for which you will be supplying data. If you are responding to the Electric Utilities module, this selection will be carried forward to assist you in completing your response.

Select country

#### CC0.4

##### Currency selection

Please select the currency in which you would like to submit your response. All financial information contained in the response should be in this currency.

THB

#### CC0.6

##### Modules

As part of the request for information on behalf of investors, companies in the electric utility sector, companies in the automobile and auto component manufacturing sector, companies in the oil and gas sector, companies in the information and communications technology sector (ICT) and companies in the food, beverage and tobacco sector (FBT) should complete supplementary questions in addition to the core questionnaire.

If you are in these sector groupings, the corresponding sector modules will not appear among the options of question CC0.6 but will automatically appear in the ORS navigation bar when you save this page. If you want to query your classification, please email [respond@cdp.net](mailto:respond@cdp.net).

If you have not been presented with a sector module that you consider would be appropriate for your company to answer, please select the module below in CC0.6.

##### Further Information

### Module: Management

#### Page: CC1. Governance

#### CC1.1

##### Where is the highest level of direct responsibility for climate change within your organization?

Board or individual/sub-set of the Board or other committee appointed by the Board

#### CC1.1a

##### Please identify the position of the individual or name of the committee with this responsibility

Sustainability Governance Structure.

In 2010, with regards to the worsening effects of global warming and climate change, PTTEP took the initiative to commit to a systematic management of this issue by establishing our own Climate Change Committee, composing of top executives, and chaired by our President & CEO.

In 2011, however, due to the growing demands of transparent disclosure of our sustainability activities and projects, and also responding and preparing for the various global sustainability challenges, PTTEP established the Sustainable Development Committee and integrated the Climate Change Committee members into the Sustainable Development (SD) Committee. Sustainable Development Committee is chaired by PTTEP's President and CEO, with top Management personnel (Executive Vice Presidents & Senior Vice Presidents) as committee members from all functional groups of the organization.

Further development was made to the SD Committee in 2012, where the Safety, Security, Health and Environment Council (SSHE) Members were integrated with the SD Committee to become a Council known as the SSHE-SD Council.

The SSHE-SD Council

In 2013, the highest governance body to oversee sustainability of PTTEP is the SSHE-SD Council chaired by the President and Chief Executive Officer (CEO) of PTTEP. The SSHE-SD Council is responsible for defining direction and approving key sustainability related documents, for example SD Framework, SD Policy, SD Guideline, PTTEP SD Roadmap, and PTTEP SD Action Plan.

The SSHE-SD Council consists of Executives from diverse backgrounds and functional groups and divisions to provide a balanced view on SD approach. To help the Council with the execution of SD initiatives, there is a Sustainable Development Working Team (SD Working Team) consisting of representatives from multiple functions. The SD Working Team is responsible for defining strategy, roadmap, key performance indicators, action plan, guidelines & tools; performance monitoring; supervising compliance; and reporting to the SSHE-SD Council. Sustainable Development Council meetings are held every quarters to review and endorse SD related issues, i.e. PTTEP GHG reduction target, energy efficiency roadmap and target, SD communication plans, update on climate change risk analysis, CSR Project highlights, and DJSI Achievement plans.

The sustainable development framework includes a wider range of aspects (social, environmental, economic) than the climate change framework which answers the sustainability challenges PTTEP faces. Climate Change issues are incorporated into the sustainable development framework as well as the

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sustainable development roadmap. A low carbon strategy roadmap was also developed to accommodate climate change issues such as reduction in greenhouse gas emissions initiatives, energy efficiency improvements, and reforestation projects.

### CC1.2

**Do you provide incentives for the management of climate change issues, including the attainment of targets?**

Yes

#### CC1.2a

**Please provide further details on the incentives provided for the management of climate change issues**

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
All employees	Monetary reward	Emissions reduction target Energy reduction target	PTTEP has annual, short and medium term GHG emissions reduction & offsetting targets. For the medium term target, PTTEP aims to at least reduce & offset GHG intensity by 25% by 2030 relative to 2012 base year covering all operating assets under our operational control. This is established as the Company's medium-term Key Performance Indicator (KPI) and goal where there will be monetary reward for all employees if this target is achieved as the KPI for 2016 was established to include percentage of carbon reduction & offsetting as a Corporate KPI which is then cascaded to functional group and then to individual KPI for relevant employees that incentivized through the allocation of their bonuses. One of the KPIs is to achieve at least 3.0% GHG emissions reduction & offsetting. This also serves as a contributing factor to employee bonuses and salary. At the moment PTTEP also bestows awards upon those within the company who have achieved excellence in the areas of innovation and performance excellence: 1. Innovation Award - It is an award competition 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. The key objective is to inspire our employees to think out of the box and create innovation for work process, technology and green practices to improve or replace existing ones and promote environmental friendly operations. In the future, it is aimed to create PTTEP intellectual property if successful. 2. Performance Excellence Award – is an award for employees to increase operational efficiency, operational 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. The team winner will all receive a monetary award for their achievements. Non-monetary award: 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

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#### Further Information

### Page: CC2. Strategy

### CC2.1

**Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities**

Integrated into multi-disciplinary company wide risk management processes

#### CC2.1a

**Please provide further details on your risk management procedures with regard to climate change risks and opportunities**

Frequency of monitoring	To whom are results reported?	Geographical areas considered	How far into the future are risks considered?	Comment
Six-monthly or more frequently	Board or individual/sub-set of the Board or committee	Thailand: North of Thailand, Northeast Thailand, and Gulf of Thailand Overseas:	> 6 years	In 2013 a Climate Change Risk Assessment (CCRA) was conducted for the time periods 2014 (short-term), 2020 and 2030. We incorporated the risks, opportunities and mitigation measures into the company wide risk management system known as the SAP GRC system to analyze our

Frequency of monitoring	To whom are results reported?	Geographical areas considered	How far into the future are risks considered?	Comment
	appointed by the Board	Canada, Australia, Myanmar, Oman, Algeria		climate change risks and update on our mitigation progresses quarterly. In 2014, we extended our risk assessment time horizons to 2015 (short-term), 2030 (medium-term) and 2050 (long-term). Risks are categorized in three areas: physical, market and regulatory. The preliminary climate change risk assessment, after endorsement by the SSHE-SD Council has been included into the Enterprise/Company-wide risk management process.

**CC2.1b**

**Please describe how your risk and opportunity identification processes are applied at both company and asset level**

## Company Level

PTTEP has operations in various countries. Some are subject, at a national level, to emission caps associated with the Paris Agreement. Although regulations concerning climate change are still developing, we do consider climate change risks and financial implications of operating in carbon-constrained countries. On a company level the Environment Management Department is responsible for implementing risk/opportunity assessment on behalf of the SD Working Team. The SSHE-SD Council approves the results of the risk assessment and then the results are incorporated into the company wide (enterprise) risk. It is the Environment Management Department's responsibility to update the company-wide mitigation plans on a quarterly basis. PTTEP evaluated its country-level risk profile by performing a Climate Change Risk Assessment (CCRA) on all countries of its operations. Climate change opportunities were also evaluated in the CCRA. Our risk profile indicated that the company is not yet exposed to significant climate change related risks. Risks are also evaluated annually and monitored the mitigation quarterly via PTTEP's SAP GRC system.

## Asset level

PTTEP's operations are mainly located in Thailand and around the world. The nature of the E&P business facilities are mainly composed of several wellheads in the same region, hence our asset-level risk assessment is defined by region rather than individual facilities. PTTEP performed a CCRA to evaluate both risks and opportunities at an asset level. Monitoring of the risk is done by the Environment Management Department in conjunction with the asset group.

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**CC2.1c**

**How do you prioritize the risks and opportunities identified?**

The criteria for determining materiality for each climate scenarios include the following: the Dow Jones Sustainability Index (DJSI) criteria by which certain material issues were identified that should be included in PTTEP's climate strategy, and the UNEP/GRID-Geneva's Global Risk Data Platform for physical risk materiality.

For physical risks, the determination of minor, moderate or major risk assessments are based on PTTEP's internally developed risk matrix. We strive to bring all risks to the ALARP (as low as reasonably practicable) threshold level. For regulatory and market (financial) risks, assessments were based on available information related to each country first, and if there are no such information, the global trend on climate changes was used instead.

**CC2.2**

**Is climate change integrated into your business strategy?**

Yes

**CC2.2a**

**Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process**

Starting from the top-influencing business strategy

PTTEP is concerned about climate change and has it integrated into PTTEP's vision and mission as well as into our business strategies and practices.

Vision: Leading Asian E&P Company driven by Competitive Performance, Advanced Technology and Green Practices.

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

SD Policy, Guideline, and Strategy

The Sustainable Development (SD) GROWTH policy elaborates on doing business sustainably by being a high performing, responsible, ethical and value creating organization. The SD Guideline is composed of three parts: business, wider society, and environment, and includes a guideline on Green Practice, in which low carbon organization is one of the targets.

In addition, the SD Roadmap serves as a company strategy towards sustainability by including Green Practice Roadmap, Business Strategic Roadmap and Wider Society Roadmap.

Green Practice Roadmap and Elements in the SD Guideline include targets and expectations on the following topics: Climate Change, Energy Efficiency, Water Related Management, Releases to the Environment, Biodiversity, Waste Management, Environmental Impact Management, Decommissioning, Green Supply Chain: Green Procurement and Green Logistics, Green Technology

Aspects of climate change that have influenced business strategy:

PTTEP's vision to adopt Green Practices has resulted in a development of Green Practice Roadmap which was approved by the SSHE-SD Council. The Low Carbon Roadmap - part of the Green Practice Roadmap - aims to reduce and offset GHG emissions from our operations via various initiatives. This is also expanding into international arenas where there are climate change regulatory risks involved, such as carbon tax; and to create competitive edge has set both medium term (2030), short term (2020) and annual targets on climate change to reduce GHG emissions. Thus, the business strategy has been changed to be more focus on doing business responsibly by mitigating environmental impacts, reducing our GHG emissions from operations, aspiring to become a low carbon organization, as well as continuous monitoring of risks arising from climate change.

PTTEP's climate change risk assessment covers reputational, market, regulatory, physical risks, and opportunities to develop into a green business. The period of assessment are covered into three parts: 2014-2015 (immediate), 2030 (medium term) and 2050 (long term).

Vital components of annual & short term strategy that have been influenced by climate change:

PTTEP has set an annual emissions reduction target with the 2016 target being at 3.0% intensity reduction of GHG from 2012 base year.

Regarding short term strategy, PTTEP has established intensity reduction target of 20% by 2020 compared with 2012 as base year.

The most important components that have been influenced by climate change include the following:

- Operational practices - include the adaptation of SD Guideline & Green Practices in PTTEP's operations.
- Business Communication - PTTEP focuses on adopting green office, green meeting & trainings, and communication of our green practice to all stakeholders.
- CSR strategies & voluntary programs to focus more on contributing to our low carbon target and practices, e.g. reforestation, energy efficiency programs awareness building for internal and external stakeholders.
- Knowledge Management & Technology - has been influenced by climate change to study more on new innovations and technologies to reduce GHG emissions, removals (Carbon Sinks), and energy efficiency practices to be implemented in the company.

PTTEP medium term strategies established by target setting of 25% intensity emission reduction by 2030 from 2012 base year that have been most influenced by climate change include the following:

- Change in company's vision, mission, corporate values, and brand identity
- Change in long term business strategies to focus more on low carbon operations opportunities, e.g. elimination of continuous flare gas in new significant assets & acquisitions, carbon credits opportunities, future operational concepts and designs on facilities to reduce GHG emissions.
- Due to climate change risks & opportunities, we aim to find opportunities to diversify our portfolio, e.g. more natural gas, and research into low carbon technologies to prepare ourselves for the next 20 - 50 years.
- Incorporate new technologies into operating processes and studies for new technologies to help reduce GHG emissions and improve energy efficiency in operations and offices.

Strategic Advantage

In terms of strategic advantage, PTTEP is presented with an overview of the world's energy outlook and potential preparations for future global trends and environmental changes, e.g. regulatory changes, physical risks and market risks. We have also seen our potential opportunities resulting from climate change, e.g. the development of T-VER (Thailand Voluntary Emission Reduction Program) together with Thailand's Greenhouse Gas Organization (TGO), with our reforestation project being the first pilot project for Thailand. It can be used to generate revenue through the sales of our carbon credits or to offset. We are also certified our first batch of carbon credits under the CDM in 2015. Our strategic advantages include integration of management of carbon emissions into core business strategies, climate change-thinking framework into investment opportunities to encourage performance improvements;

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managing carbon emissions and; protecting business assets from climate change impacts to achieve sustainability and in effect, creating strong shareholder returns. Additionally, by moving into countries without well-developed climate change policies PTTEP has the potential to set itself up as an example for that country to develop greener policies.

The most substantial business decisions made

While Thailand operational emissions would not be subjected to direct regulation in the foreseeable future, we may experience increased costs if direct carbon taxes or mandatory emission caps are imposed. For these reasons, we became involved with T-VER development and initiated a project under CDM. For example, 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. The decision was made to remain committed to managing climate change risks and direct opportunities to improve energy efficiency and reduce carbon footprint from our business. In addition, PTTEP considers climate change as one of the company's environmental management focus as we believe climate change is real and PTTEP should contribute to the fight against climate change for the benefit of mankind and nature.

#### CC2.2c

**Does your company use an internal price on carbon?**

Yes

#### CC2.2d

**Please provide details and examples of how your company uses an internal price on carbon**

PTTEP has established carbon pricing policy and included it in the PTTEP Environmental Management Standard. PTTEP already uses an internal price of carbon in the economic model for some assets located in Canada and Thailand. The internal price is implemented in Canada first as there is already an existing carbon price in this region. In 2016, PTTEP began to include carbon pricing in new project assessment related to flare gas recovery unit of a Thailand offshore asset by using reference price from the Thailand Greenhouse Gas Management Organization (TGO) which increases the project economic viability. For the other countries, internal carbon pricing will be aligned with the country regulation that we operate and also included in process of PTTEP decision making for investment.

#### CC2.3

**Do you engage in activities that could either directly or indirectly influence public policy on climate change through any of the following? (tick all that apply)**

Direct engagement with policy makers

#### CC2.3a

**On what issues have you been engaging directly with policy makers?**

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
Cap and trade	Support	PTTEP has signed a memorandum of understanding (MOU) with Thailand's Greenhouse Gas Organization (TGO) to be the first of Thailand's pilot project for the Thailand Voluntary Emission Reduction Program (T-VER), an initiative by TGO to develop a carbon market in Thailand. 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.	The projects help to promote a voluntary carbon market in Thailand for trading and offsetting carbon.
Cap and trade		In January, 2013, PTTEP's Sao-Thien A's flare gas recovery and utilization project was registered by UNFCCC's CDM Executive Board as a CDM project. We are currently certified for 10,581 tCO <sub>2</sub> e of our carbon credits.	The project helps to support the CDM program and expands the adoption of carbon reduction projects in Thailand

#### CC2.3f

**What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?**

PTTEP's commitment to green practices is part of our mission. The T-VER and CDM projects are consistent with our drive to reduce our carbon footprint. Our SD Working Team oversees activities related to the T-VER and CDM projects. Prior to the project, we conducted a thorough review to ensure that TGO's emissions policies with regards to its Thailand Voluntary Emission Reduction Program (T-VER) was in line with PTTEP's goals to reduce emissions in the future through a trading scheme. PTTEP then signed the MOU for a Demonstration Project of Thailand Voluntary Emission Reduction Program (T-VER) with TGO, i.e. Reforestation project. With the acknowledgment and approval from the SD Working Team members, PTTEP's Reforestation Project was implemented in 2013 as a demonstration project of the T-VER Program in the field of Forest and Agriculture, Sustainable Forestation branch. The company was the first candidate, out of 8, selected as qualifying demonstration Project. PTTEP joined T-VER to support the volunteer carbon market initiation in

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Thailand especially in the field of Sustainable Forestation, which not only reduces carbon dioxide emission but also increases oxygen to the earth along with air pollution reduction. The gained knowledge and experiences from participating in this demonstration will augment future greenhouse gas reduction projects of the company. Throughout the project, we continue to regularly report any activities and updates to the SD Working Team members to ensure consistency with our climate strategy.

In addition, PTTEP has continually collaborated with TGO to develop a methodology on reduction of GHG for Methane Leak Detection and Repairing in Petroleum Processing and Distribution Systems in 2016. This can help to encourage all sectors to participate in voluntary carbon market leading to country GHG emission reduction.

#### Further Information

#### Page: CC3. Targets and Initiatives

##### CC3.1

Did you have an emissions reduction or renewable energy consumption or production target that was active (ongoing or reached completion) in the reporting year?

Absolute target

Intensity target

##### CC3.1a

Please provide details of your absolute target

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions covered by target (metric tonnes CO2e)	Target year	Is this a science-based target?	Comment
Abs1	Scope 1+2 (location-based)	86.2%	4.4%	2015	4165682	2016	No, but we anticipate setting one in the next 2 years	PTTEP sets year-on-year absolute target as a part of our overall emissions reduction plan. For 2016, the target was to reduce emissions by 181,300 tCO2e, exclusive of our offsets from reforestation program. Actual GHG reduction in 2016 was about 239,400 tCO2e which is equivalent to 5.7% reduction vs. 4.4% reduction target. This results from the reduction activities detailed in CC3.3b.
Abs2	Scope 3: Waste generated in operations	100%	42.5%	2014	29581	2016	No, but we anticipate setting one in the next 2 years	This target is developed from zero hazardous waste to landfill target covering Thailand domestic assets. GHG emission from hazardous waste to landfill generated in 2016 was 940 tCO2e which is equivalent to 96.8% vs. 42.5% target.

##### CC3.1b

Please provide details of your intensity target

ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions covered by target	Target year	Is this a science-based target?	Comment
Int1	Scope 1+2 (location-based)	86.2%	20%	Other: Metric tonnes of CO2e per 1000 tonne of production	2012	337	2020	No, but we anticipate setting one in the next 2 years	The target set on year 2012 covering 5 domestic assets which is equivalent to 86.2% GHG emission in scope. In 2016, actual GHG intensity reduction was 16.0%. In early 2017, PTTEP has established medium term GHG intensity reduction target by 25% in 2030 compared with 2012

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ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions covered by target	Target year	Is this a science-based target?	Comment
									base year. This target covering 100% all operating assets under PTTEP operational control is complied with 2 degrees Celsius scenario for energy sector identified by International Energy Agency (IEA). In addition, in 2050 PTTEP intends to implement zero continuous flare policy as committed in SD guideline.
Int2	Scope 3: Use of sold products	87.1%	5%	Other: Metric tonnes of CO2e per thousand tonne of production	2012	362	2020	No, but we anticipate setting one in the next 2 years	Use of sold products is a majority of GHG scope 3 for oil and gas upstream business and natural gas is majority of PTTEP product volume which is equivalent to 87.1% of PTTEP GHG emission, thus, PTTEP has set target for this scope 3 category. PTTEP's sole customer for natural gas product is PTT which has set to reduce GHG intensity emission at 5% by 2020 from 2012 as base year. Therefore, this target is also cascaded to PTTEP natural gas product sold to PTT.

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**CC3.1c**

Please also indicate what change in absolute emissions this intensity target reflects

ID	Direction of change anticipated in absolute Scope 1+2 emissions at target completion?	% change anticipated in absolute Scope 1+2 emissions	Direction of change anticipated in absolute Scope 3 emissions at target completion?	% change anticipated in absolute Scope 3 emissions	Comment
Int1	Decrease	26.9			The change in absolute scope 1 + 2 emissions was projected by multiplying the projected production for 2020 by the intensity target for 2020. The scope of absolute scope 1 +2 emissions is for 5 operating assets within Thailand only. The anticipated decrease in absolute scope 1+2 emissions is due to both the targeted reduction in emissions intensity and also to a projection of decreased production, as well as carbon offsetting by reforestation. In addition, PTTEP has a plan to study carbon footprint in 2017 and scope 3 GHG target setting will be in this plan.
Int2			Increase	8.6	The change in absolute scope 3 emissions was projected by multiplying the projected production for 2020 by the intensity target for 2020. The anticipated increase in scope 3 emission was due to increase in forecasted production in 2020.

**CC3.1e**

For all of your targets, please provide details on the progress made in the reporting year

ID	% complete (time)	% complete (emissions or renewable energy)	Comment
Abs1	100%	100%	
Abs2	100%	100%	



ID	% complete (time)	% complete (emissions or renewable energy)	Comment
Int1	50%	80%	
Int2	50%	100%	

**CC3.2**

**Do you classify any of your existing goods and/or services as low carbon products or do they enable a third party to avoid GHG emissions?**

Yes

**CC3.2a**

**Please provide details of your products and/or services that you classify as low carbon products or that enable a third party to avoid GHG emissions**

Level of aggregation	Description of product/Group of products	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment
Company-wide	The use of natural gas instead of coal to generate electricity and as other power sources. Natural gas is a major source of electricity generation through the use of gas turbines and steam turbines. Most grid peaking power plants and some off-grid engine-generators use natural gas. Particularly high efficiencies can be achieved through combining gas turbines with a steam turbine in combined cycle mode. Natural gas burns more cleanly than other Hydrocarbon fuels, such as oil and coal, and	Low carbon product and avoided emissions	Other: The PTT GHG Tool allows the input of fuel data in terms of mass or volume only, therefore volume of gasoline and mass of lignite were converted from the energy value of the natural gas sold in 2016 using NCV values. The volume of gasoline and mass of lignite values were input into the tool as well as the volume of total natural gas sales. Avoided emissions were simply calculated by subtracting the high value of emissions with the emissions for natural gas combustion. Emission factors: 1. Emissions include carbon dioxide (CO2), methane (CH4) and nitrous oxide 2. Fuel volume/mass was converted in the PTT GHG Tool in energy values using NCV values from "Electric Power In Thailand, Department of Alternative Energy Development and Efficiency, Ministry of Energy, DEDE (2010)." 3. Emission factors for stationary combustion lignite came from "2006 IPCC Guidelines for National Greenhouse Gas Inventories" developed by the Intergovernmental Panel on Climate Change (IPCC) Vol.2 Ch.2 Table 2.2 4. Emission factors for mobile combustion of gasoline came from "2006 IPCC Guidelines for National Greenhouse Gas Inventories" developed by the Intergovernmental Panel on Climate Change (IPCC) Vol. 2 Ch. 1 table 1.4 5. GWP from IPCC AR4 (100 years) <a href="http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html">http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html</a>	64.9%	Less than or equal to 10%	PTTEP has planned to invest in Knowledge Management amount of at least 3% of annual net profit. Knowledge management, including new technologies and capability of the Company's research and development program, is developed to be in line with the Company's growth strategy. The Capability and Technology Development Roadmap was created as well as research on technology to support business growth in 3

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Level of aggregation	Description of product/Group of products	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment
	produces less carbon dioxide per unit of energy released. For an equivalent amount of heat, burning natural gas produces about 30% less carbon dioxide than burning petroleum and about 45% less than burning coal. Combined cycle power generation using natural gas is thus the cleanest source of power available using hydrocarbon fuels and this technology is widely used wherever gas can be obtained at a reasonable cost.					areas which are focused to increase exploration success, enhance more production, and develop green practice.

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**CC3.3**

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

Yes

**CC3.3a**

Please identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO2e savings

Stage of development	Number of projects	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	5	120000
To be implemented*	0	0
Implementation commenced*	0	0
Implemented*	7	2513000
Not to be implemented	0	0

**CC3.3b**

For those initiatives implemented in the reporting year, please provide details in the table below

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
Waste recovery	PTTEP aims to reduce continuous flaring as much as possible. Continuous flaring is accounted for under scope 1 emissions. The reduction in flaring was voluntary. Since 2012 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 oil wells at 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.	24000	Scope 1	Voluntary	23000000	63900000	11-15 years	6-10 years	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.
Transportation: fleet	Emissions reductions for the transportation fleet were under scope 1 emissions since all transportation involved was owned by PTTEP. All transportation emissions reductions were voluntary. Under the Low Carbon Footprint Roadmap, PTTEP implemented the Marine Green Logistics strategy to reduce GHG emissions from marine transportation and supply chain. In 2015, the company expanded the New Marine Vessel project, which was launched in 2012, by increasing the	49000	Scope 1	Voluntary	95300000	959000000	1-3 years	6-10 years	Annual monetary savings in the original currency was 18.3 MMUSD. Investment required was 28 MMUSD. These were converted using a rate of 34.25 THB per USD.

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Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
	efficiency of marine transportation in the Gulf of Thailand. PTTEP developed a management improvement program for control and monitoring the vessels that are used in the Gulf of Thailand by selecting fuel efficient vessels within its fleet of service as a first priority of service planning for the shortest travelling distances, and carrying maximum load as well as implemented of new marine model in AHTS fleet. As a result, in 2016 the average fuel consumption of each vessel has been reduced compared to 2012. Overall, PTTEP could reduce GHG emission reductions of 49,000 tCO2e per year.								
Waste recovery	Flash Gas Recovery Unit Project at Greater Bongkot South, Thailand -Emissions reductions at the Flash Gas Recovery Unit fall under scope 1 emissions since the FGRU is owned by PTTEP. Emissions reductions at the FGRU were voluntary. The flash gas recovery unit project commenced in 2014. It recovers gas from condensate production and puts it back into the gas production process which would otherwise be flared. The recovery is about 11 million cubic feet per day, or 4,015 million cubic feet in	140000	Scope 1	Voluntary	329800000	342500000	<1 year	6-10 years	Investment required was USD 10M and was converted using a rate of 34.25 THB per USD.

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Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
	total for 2016. This is equivalent to reduction of 142,000 tCO2e of GHG emissions.								
Energy efficiency: Processes	In 2014, PTTEP installed Heat Recovery Steam Generator (HRSG) in Sirikit oil field, to recover waste heat and utilize in steam boiler. In 2016, 8,000 tonnes CO2 equivalent of GHG reduction was achieved.	8000	Scope 1	Voluntary	29700000	65000000	<1 year	3-5 years	Investment required was USD 1.9 M and was converted using a rate of 34.25 THB per USD.
Fugitive emissions reductions	In 2013, PTTEP conducted a methane emission database for the Sirikit oilfield, where we reduced fugitive emissions of GHGs by 4,800 tonnes of CO2e equivalent per year. Maintenance during the production process also helps to mitigate Loss of Primary Content (LOPC) risks.	4800	Scope 1	Voluntary	2700000	0	<1 year	1-2 years	No investment, fixed leak of fugitive emission in process
Energy efficiency: Processes	Optimization of sea water pump operation, PTTEP implemented the measure summarized from the studies at Arthit Production platform by shutting down some of the sea water pumps used to generate cooling water for other machines	5500	Scope 1	Voluntary	15000000	0	<1 year	3-5 years	No investment, optimize operation and process condition
Waste recovery	project aims to reduce flaring at remote station of Sirikit Oilfield by transporting excess gas through pipelines to be consolidated and reused at the main production facilities. The project	20000	Scope 1	Voluntary	54000000	763000000	4-10 years	6-10 years	Investment required was USD 21.62 M and was converted using a rate of 35.29 THB per USD.

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Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
	started to operate in the 4th quarter of 2016.								

**CC3.3c**

What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Dedicated budget for energy efficiency	In order to achieve our vision of being a leading Asian E&P company driven by green practices and technology, and also aspiring to become a low carbon organization, this target has been included in the long term business strategy, and dedicated budgets for energy efficiency are included in the corporate 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 product are in PTTEP research & development plan.
Other	In order to achieve our vision of being a leading Asian E&P company driven by competitive performance, advanced technology and green practices, and also aspiring to become a low carbon organization, this target has been included in the long term business strategy. The company wide target as well as the key performance indicators are set. By incorporating into the long term business strategy to become part of our company vision, investment budgets for GHG emissions reductions and offsets are dedicated for this purpose. 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 Employee Engagement: initial investments into projects that can reduce and offset GHG. 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.

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**Further Information**

**Page: CC4. Communication**

**CC4.1**

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	Status	Page/Section reference	Attach the document	Comment
In mainstream reports (including an integrated report) in accordance with the CDSB Framework	Complete	SD report, p.35	<a href="#">2016 Sustainability report.pdf</a>	
In mainstream reports (including an integrated report) in accordance with the CDSB Framework	Complete	Annual report, p.45	<a href="#">2016 Annual Report.pdf</a>	

**Further Information**

**Module: Risks and Opportunities**

**Page: CC5. Climate Change Risks**

**CC5.1**

Have you identified any inherent climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Risks driven by changes in regulation  
 Risks driven by changes in physical climate parameters  
 Risks driven by changes in other climate-related developments

**CC5.1a**

**Please describe your inherent risks that are driven by changes in regulation**

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Carbon taxes	Our Mariana asset in Alberta is currently in the exploration phase with the target of first steam within the next 5-10 years. Alberta's current climate change policy includes a \$15/ton tax on emissions over 100,000 tonnes of greenhouse gas annually. There is a possibility that the limit of greenhouse gas emissions may be lowered or the taxation amount to increase, leading to a higher operating cost for PTTEP.	Increased operational cost	>6 years	Direct	Virtually certain	Low	12,000,000 USD or 420,000,000 THB	PTTEP follows Company Risk Management Procedure to mitigate this risk. Apart from using the carbon price in our Mariana economic model, PTTEP has included carbon price policy into Environmental Management Standard to anticipate future tax burden and reduce the tax liability. The mitigation schemes to reduce GHG emission was evaluated to compare with paying of carbon tax by using carbon pricing concept. For example, in case Carbon Capture and Storage (CCS) is implemented to be zero continuous flaring reduction, investment cost of this mitigation will be of 30 MMUSD approx. In addition, carbon tax risk included into organization risk management and green practice strategy which dictates greenhouse gas reductions initiatives, energy efficiency improvement and other carbon offsetting schemes into our operations.	It is estimated that 30,000,000 USD can be allocated to greenhouse gas mitigation projects.
			>6 years	Direct	Very likely	Low			

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Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Cap and trade schemes	We considered impact of carbon taxes and cap and trade mechanisms, including internal emissions reduction requirements in the future. PTTEP is prepared to respond to a carbon emissions cap or a carbon emissions market in Thailand.	Increased operational cost					354,000,000 THB	PTTEP wants to be proactive in engaging in the carbon market. For example, it has already been involved in the creation of the Sao-Thian A (oil field) Flare Gas Recovery and Utilization Project as a CDM project. Currently, PTTEP has been certified by UNFCCC. It also registered the T-VER (Thailand's equivalent of CERs) for its reforestation projects for 5,000 Rai.	CDM Management at Sao Thien A is approximately 2 MM USD (60 MM THB) per year and T-VER program for reforestation is at 70 MM USD (2,100 MM THB) for the whole program. The total is approximately 72 MM USD (2,160 MM THB).

**CC5.1b**

Please describe your inherent risks that are driven by changes in physical climate parameters

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Tropical cyclones (hurricanes and typhoons)	Swell impact on production and wellhead platforms from cyclonic events can be occurred. Swell height increases associated with increased tropical cyclone severity may exceed the current production platform design basis for Thailand offshore assets.	Reduction/disruption in production capacity	>6 years	Direct	Unlikely	Medium-high	Based on assumption that Thailand offshore operations are disrupted 7 days, financial impact is about 49 MMTHB	Currently, main platforms are designed to perform operations with swell projections within tolerable limits and with contingency of having 1-2 meters greater than design basis. Following to swell projections, this event will not be occurred before 2030. However, the swell height projections are reviews every 2 years. In case that assessment of probability of the swell height will reach or exceeding	7,000 MMTHB

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Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								platform height, management of potential impact require shut down of operations and jacking up of structures to increase height.	

**CC5.1c**

Please describe your inherent risks that are driven by changes in other climate-related developments

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Reputation	We consider potential risks which may impact our reputation and quantify it by potential drop in share price basis points. Examples of past events that had an impact on PTTEP's share price was the accident at PTTEP's Montara operations. Other potential incidents that could affect PTTEP's reputation include oil spills, accidents and other major environmental disasters.	Reduced stock price (market valuation)	>6 years	Direct	Likely	Medium-high	In August 2009, PTTEP experienced an accident at its Montara operations in Australia. This resulted in share price plunging down from THB 180 to an all-time low of 50 at the end of 2009. The potential impact on PTTEP share price if such incidents were to happen is anticipated to be between -70% to -80%.	Ensure to enhance brand image with good reputation in the eyes of stakeholders, communities and the public, and educate the public on energy literacy. PTTEP will continue to ensure the transparency of our sustainability performance through our annual reports.	20,000,000 USD or 660,000,000 THB. This is the current budget to improve PTTEP's branding and image. It also includes media, advertising and public relations as well as philanthropy, CSR and social investment projects.
Other drivers	Fuel diversification: Global trends focus more and more on climate change issues and their mitigations and adaptation, leading to higher demand of other	Inability to do business	>6 years	Direct	Likely	Medium	700 MMTHB was estimated based on assumption that change to alternative fuels by 2050 likely to have a 10% impact on production demand.	PTTEP short term strategy is to increase gas proportion of company portfolio by acquiring new investment in gas fields such as Mozambique Rovuma Offshore Area 1 project	12 MMUSD or 400 MMTHB is budget allocated for technology development in 2016.

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Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	energy forms, i.e. renewable energy. However, natural gas is as a transition fuel which can mitigate climate change impact by less carbon emission than coals and other fossil fuels.							which is large natural gas field located offshore of Mozambique. In addition, PTTEP has established new organization who is responsible for technology research & development. One of their missions is focused on new business development and diversification. For example, PTTEP is developing a project by using our waste stream like flare gas to create new product, i.e. carbon nanotube.	

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**Further Information**

**Page: CC6. Climate Change Opportunities**

**CC6.1**

**Have you identified any inherent climate change opportunities that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply**

- Opportunities driven by changes in regulation
- Opportunities driven by changes in other climate-related developments

**CC6.1a**

**Please describe your inherent opportunities that are driven by changes in regulation**

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Other regulatory drivers	International agreements: PTTEP considers the opportunity to develop more carbon credits and also improve on our operations by being more energy efficient which also reduces our GHG emissions.	Increased stock price (market valuation)	>6 years	Direct	Likely	Low-medium	97,000 USD (based on T-VER CER price of 200 Baht/tCO2e) = 3,400,000 THB	The management method is to proactively engage in the carbon trading market. For example, PTTEP initiated the Sao-Thien A oil field Flare Gas Recover and Utilization	CDM Management at Sao Thien A is approximately 5 Million THB per year.



Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	Selling carbon credits also provides extra revenue and also promotes PTTEP's image as a energy efficient and environmentally conscientious company.							Project as our first CDM project. The anticipated CERs from the project is approximately 17,000 tCO2e/yr (over 8 years).	

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**CC6.1c**

Please describe your inherent opportunities that are driven by changes in other climate-related developments

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Changing consumer behavior	Climate change may drive consumers towards higher consumption of natural gas to replace fuels such as coal and lignite. Natural gas is a key fuel source in the transition towards a low-carbon economy.	Increased demand for existing products/services	>6 years	Indirect (Client)	More likely than not	High	2,720 million USD or 95,989 million THB. The financial implication is the revenue generated from natural gas sales in 2016.	PTTEP continues to focus on natural gas exploration and production. Our portfolio already has a natural gas bias, which currently is 65% by revenue. In addition, the more energy we save means the less fuel gas is needed, which results in more gas available for sale. Our energy efficiency target, a 5% reduction by 2020 based on 2012 base year, is part of the effort to reduce our fuel gas consumption. For example, the Arthit seawater pump optimization resulted in savings of 73 MMSCF, and the	2,149 million USD or 75,867 million THB. The annual cost is estimated by taking the total operating and capital expenses multiplied by the revenue proportion of natural gas in PTTEP's portfolio (65%).

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Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								Sirikit Heat Recovery Steam Generator saved 76 MMSCF in 2016.	

**CC6.1e**

Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure

There is typically limited opportunities arising from physical climate parameters in the oil and gas sector. Mostly, the opportunity in oil and gas sector revolves around increased access to arctic exploration. PTTEP, which fall in the oil and gas sector, currently operate in tropical and temperate climates around the world. PTTEP currently does not have plans to participate in arctic exploration and therefore there are no inherent opportunities due to physical climate change to PTTEP.

**Further Information**

**Module: GHG Emissions Accounting, Energy and Fuel Use, and Trading**

**Page: CC7. Emissions Methodology**

**CC7.1**

Please provide your base year and base year emissions (Scopes 1 and 2)

Scope	Base year	Base year emissions (metric tonnes CO2e)
Scope 1	Sun 01 Jan 2012 - Mon 31 Dec 2012	4431143
Scope 2 (location-based)	Sun 01 Jan 2012 - Mon 31 Dec 2012	1649
Scope 2 (market-based)		

**CC7.2**

Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Please select the published methodologies that you use
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)
Other

**CC7.2a**

If you have selected "Other" in CC7.2 please provide details of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

1. PTT Group Greenhouse Gas Standard  
 This standard is provided by PTT Plc for its daughter companies and is written to encompass the majority of GHG activities within PTT Group's various operations. It is based on the following documents for its emissions calculation methodologies and emission factors:  
 2006 IPCC Guidelines for National Greenhouse Gas Inventories  
 American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry, 2009

For Thailand's grid electricity emissions the following document is referenced:  
 Power Development Plan, PDP (2010). (Thailand)

For local NCV values of fuels the standard references:  
 Electric Power In Thailand, Department of Alternative Energy Development and Efficiency, Ministry of Energy, DEDE (2010).

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2. PTT Group Greenhouse Calculation tool

This tool implements the methodologies and emission factors in the PTT GHG Standard in a user friendly Excel based calculation tool. The tool calculates emissions, energy consumption and intensity data at the facility level in the facility level tool. The facility level data is then consolidated into the company level tool and finally at the corporate level of PTT group. PTTEP utilized the facility level and company level tools to assist in calculating its emissions. The ultimate goal of the tool is to consolidate GHG, energy and intensity data for all companies and facilities that are in PTT Group's operational or equity share boundary.

**CC7.3**

Please give the source for the global warming potentials you have used

Gas	Reference
CO2	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	IPCC Fourth Assessment Report (AR4 - 100 year)
HFCs	IPCC Fourth Assessment Report (AR4 - 100 year)
SF6	IPCC Fourth Assessment Report (AR4 - 100 year)

**CC7.4**

Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data at the bottom of this page

Fuel/Material/Energy	Emission Factor	Unit	Reference
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**Further Information**

Please see attachment for CC7.4 which includes the GHG emission factors used in the PTT GHG Tool, which PTTEP used to calculate its emissions.

**Attachments**

[CC7.4 PTTEP Emission Factors 2016.xlsx](#)

**Page: CC8. Emissions Data - (1 Jan 2016 - 31 Dec 2016)**

**CC8.1**

Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Operational control

**CC8.2**

Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e

4631491

**CC8.3**

Please describe your approach to reporting Scope 2 emissions

Scope 2, location-based	Scope 2, market-based	Comment
We are reporting a Scope 2, location-based figure		

**CC8.3a**

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
5666		

**CC8.4**

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

**CC8.5**

Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1			

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Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
	More than 5% but less than or equal to 10%	Metering/ Measurement Constraints	PTTEP's scope 1 emissions mainly came from stationary combustion and flaring. The flow meters that measure the raw data for these activities had an uncertainty of more than 5% but less than or equal to 10%.
Scope 2 (location-based)	Less than or equal to 2%	Metering/ Measurement Constraints	For Scope 2, PTTEP purchased electricity from Provincial Electricity Authority (PEA), which is a state-owned enterprise. What we usually received from PEA upon purchasing their electricity is the bill or receipt of purchase. The verification process of PEA's GHG emissions on data certainty is not within PTTEP's responsibility. PTTEP's scope of determining the uncertainty from PEA's source is not within our reporting boundary. However, since PEA is a state-owned enterprise, it is subjected to a special legislation that regulates state-owned enterprises in Thailand; therefore the uncertainty range of scope 2 emissions from source should be less than or equal to 2% for them to be able to sell their electricity to the public.
Scope 2 (market-based)			

**CC8.6**

Please indicate the verification/assurance status that applies to your reported Scope 1 emissions

Third party verification or assurance process in place

**CC8.6a**

Please provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported Scope 1 emissions verified (%)
Annual process	Complete	Limited assurance	<a href="#">2016 Sustainability report.pdf</a>	Page 60 -61	AA1000AS	93

**CC8.7**

Please indicate the verification/assurance status that applies to at least one of your reported Scope 2 emissions figures

Third party verification or assurance process in place

**CC8.7a**

Please provide further details of the verification/assurance undertaken for your location-based and/or market-based Scope 2 emissions, and attach the relevant statements

Location-based or market-based figure?	Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 2 emissions verified (%)
Location-based	Annual process	Complete	Limited assurance	<a href="#">2016 Sustainability report.pdf</a>	Page 60 -61	AA1000AS	100

**CC8.8**

Please identify if any data points have been verified as part of the third party verification work undertaken, other than the verification of emissions figures reported in CC8.6, CC8.7 and CC14.2

Additional data points verified	Comment
Other:	KPMG Phoomchai Audit Ltd. was commissioned by PTT Exploration and Production Public Company Limited (PTTEP) to provide independent assurance on its Sustainability Report 2016 ("the Report") to a limited level of assurance. Our assurance engagement

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Additional data points verified	Comment
	covered PTTEP's production operations phase and activities in Thailand and Australia only and specifically the following requirements: - Confirming whether the selected environmental and occupational health and safety indicators: EN3,EN8, EN15-17, EN20-21, EN22, EN23, EN24, OG4, OG5, OG7 and LA6 were compiled according to GRI G4's Sustainability Reporting Guidelines and GRI G4's Oil and Gas Sector Disclosure, and - Evaluating the reliability of the data and information for the above selected environmental and occupational health and safety indicators.

**CC8.9**

**Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?**

No

**Further Information**

**Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2016 - 31 Dec 2016)**

**CC9.1**

**Do you have Scope 1 emissions sources in more than one country?**

Yes

**CC9.1a**

**Please break down your total gross global Scope 1 emissions by country/region**

Country/Region	Scope 1 metric tonnes CO2e
Thailand	4048528
Australia	242670
Oman	80496
Myanmar	259797

**CC9.2**

**Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)**

By facility

By GHG type

By activity

**CC9.2b**

**Please break down your total gross global Scope 1 emissions by facility**

Facility	Scope 1 emissions (metric tonnes CO2e)	Latitude	Longitude
GBN	740973	7.89501	102.4656
GBS	2033004	7.65743	102.680852
ART	750564	8.24169	102.47739
S1 & L22/43	463501	16.80199	99.95117
Suphanburi	4590	14.33893	99.97073
SPH	55736	16.677019	102.771435
PSB	130	7.23497	100.56158
RSB	30	10.030612	98.633312
PTTEP AA	242670	-13.57462	123.29637
Oman44	80496	23.41253	55.69159
Zawitka	259797	14.190867	96.045583

**CC9.2c**

**Please break down your total gross global Scope 1 emissions by GHG type**

GHG type	Scope 1 emissions (metric tonnes CO2e)

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GHG type	Scope 1 emissions (metric tonnes CO2e)
CO2	4262500
CH4	366131
N2O	4235
HFCs	4722
SF6	410

**CC9.2d**

Please break down your total gross global Scope 1 emissions by activity

Activity	Scope 1 emissions (metric tonnes CO2e)
Flare	2634656
Stationary Combustion	1591997
Mobile Combustion	150600
Vent Emission	491
Fugitive Emission	248223
Fugitive of Fluorinated Gas	5132

**Further Information**

**Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2016 - 31 Dec 2016)**

**CC10.1**

Do you have Scope 2 emissions sources in more than one country?

Yes

**CC10.1a**

Please break down your total gross global Scope 2 emissions and energy consumption by country/region

Country/Region	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Thailand	5283		29697	
Australia	383		1897	

**CC10.2**

Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)

By facility

By activity

**CC10.2b**

Please break down your total gross global Scope 2 emissions by facility

Facility	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
S1	1961	
Suphanburi	1440	
SPH	983	
PSB	782	
RSB	116	
PTTEP AA	383	

**CC10.2c**

Please break down your total gross global Scope 2 emissions by activity

Activity	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
Electricity Purchased	5666	

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**Page: CC11. Energy**

**CC11.1**

What percentage of your total operational spend in the reporting year was on energy?

More than 5% but less than or equal to 10%

**CC11.2**

Please state how much heat, steam, and cooling in MWh your organization has purchased and consumed during the reporting year

Energy type	MWh
Heat	0
Steam	0
Cooling	0

**CC11.3**

Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year

7281044

**CC11.3a**

Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

Fuels	MWh
Motor gasoline	59
Jet kerosene	20368
Natural gas	6425176
Other: Diesel/Gas oil (mobile)	535511
Other: Diesel/Gas oil (stationary)	274509
Other: Biodiesels (stationary)	8465
Other: Biodiesels (mobile)	18410
Liquefied petroleum gas (LPG)	4017
Other: Ethanol	4

**CC11.4**

Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

Basis for applying a low carbon emission factor	MWh consumed associated with low carbon electricity, heat, steam or cooling	Emissions factor (in units of metric tonnes CO2e per MWh)	Comment
No purchases or generation of low carbon electricity, heat, steam or cooling accounted with a low carbon emissions factor	0	0.454	The provided figure of 0.454 tCO2e/MWh is the location-based scope 2 factor as PTTEP has no consumption of market – based scope 2.

**CC11.5**

Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

Total electricity consumed (MWh)	Consumed electricity that is purchased (MWh)	Total electricity produced (MWh)	Total renewable electricity produced (MWh)	Consumed renewable electricity that is produced by company (MWh)	Comment
316664	8105	308169	390	390	

**Further Information**

**Page: CC12. Emissions Performance**

**CC12.1**

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

Decreased

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**CC12.1a**

Please 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

Reason	Emissions value (percentage)	Direction of change	Please explain and include calculation
Emissions reduction activities	4.90	Decrease	In 2016, 239,409 tCO <sub>2</sub> e were reduced by our emissions reduction projects. Total emissions were 4,890,180 tCO <sub>2</sub> e in 2015. Therefore, we arrived at emissions reduction of $239409/4890180 = 4.90\%$ . Emissions reduction activities in 2016 included the flare gas recovery project at Greater Bongkot South, Sao-Thien A Oil Field flare gas recovery and utilization, heat recovery steam generator at Sirikit oil field, seawater pump optimization, expansion of the marine vessel project, the reduction of methane fugitive emissions, and Trunk flow line at Sirikit oilfield which is new initiative implemented in 2016. More details of these projects can be found in CC3.3b.
Divestment			
Acquisitions			
Mergers			
Change in output	2.96	Decrease	Decreasing in 2016 production rate can lead to 2.96% decrease in emissions.
Change in methodology			
Change in boundary			
Change in physical operating conditions			
Unidentified			
Other	2.69	Increase	The other reasons are related to more energy consumption, e.g. energy consumed for gas injection activity in Australia offshore operations which was commissioned in 2016.

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**CC12.1b**

Is your emissions performance calculations in CC12.1 and CC12.1a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

**CC12.2**

Please describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO<sub>2</sub>e per unit currency total revenue

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: Unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.000030359	metric tonnes CO <sub>2</sub> e	152745219483	Location-based	19.14	Increase	Although emission reduction initiatives detailed in CC3.3b, such as the flare gas recovery projects and the marine vessel project can reduce GHG emission higher than 2015 performance, the increase in intensity (tonne CO <sub>2</sub> e per unit total revenue) was observed. This was due to a significant decrease in revenue from oil price crisis. Note: the consolidated revenue is used as the denominator for the calculations.

**CC12.3**

Please provide any additional intensity (normalized) metrics that are appropriate to your business operations

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
251	metric tonnes CO2e	Other: Thousand tonnes of production	18452	Location-based	2.33	Decrease	The decrease was due to global scope 1 and 2 emission reduction from GHG reduction initiatives implementation detailed in CC3.3b, including the flare gas recovery projects and the marine vessel project. In 2016, Trunk flow line project was commissioned in 2016 leading to increase in GHG reduction compared with 2015.

#### Further Information

#### Page: CC13. Emissions Trading

##### CC13.1

Do you participate in any emissions trading schemes?

Yes

##### CC13.1a

Please complete the following table for each of the emission trading schemes in which you participate

Scheme name	Period for which data is supplied	Allowances allocated	Allowances purchased	Verified emissions in metric tonnes CO2e	Details of ownership
Other: Clean Development Mechanism (CDM)	Thu 17 Jan 2013 - Wed 16 Jan 2019	0	0	10581	Facilities we own and operate

##### CC13.1b

What is your strategy for complying with the schemes in which you participate or anticipate participating?

PTTEP has been certified in 2015 by the United Nations Framework convention on Climate Change (UNFCCC) for its CDM project, Sao-Thien A Oil Field Flare Gas Recovery and Utilization Project in Sukhothai, Thailand. Effective on 17th January 2013 the CDM project has been successfully registered as a CDM project. As of the end of 2013, the project has resulted in emission reductions equivalent to 10,581 tCO2e and been issued of 10,581 tCO2 certified emission reduction (CER) (for 2013 emission reductions) in 2015. The carbon credit is valid until January 2019.

In 2014, PTTEP has participated in T-VER pilot project in Reforestation and the carbon reduction from that project was approved and certified by Thailand Greenhouse Gas Organization (TGO). PTTEP also has a plan to acquire the emission reduction certified from the additional 100,000 rai of reforestation by TGO in the near future.

##### CC13.2

Has your organization originated any project-based carbon credits or purchased any within the reporting period?

Yes

##### CC13.2a

Please provide details on the project-based carbon credits originated or purchased by your organization in the reporting period

Credit origination or credit purchase	Project type	Project identification	Verified to which standard	Number of credits (metric tonnes CO2e)	Number of credits (metric tonnes CO2e): Risk adjusted volume	Credits canceled	Purpose, e.g. compliance
Credit origination	Other: Flare reduction	Sao-Thien A Oil Field Flare Gas Recovery and Utilization Project	CDM (Clean Development Mechanism)	10581	10581	No	Voluntary Offsetting
Credit origination	Other: Reforestation	Reforestation of pilot project at 5,200 rai	Other: T-VER	4940	4940	No	Voluntary Offsetting

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**Page: CC14. Scope 3 Emissions**

**CC14.1**

Please account for your organization's Scope 3 emissions, disclosing and explaining any exclusions

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Purchased goods and services	Relevant, calculated	0	The calculation is done using 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 SD Day event which was a carbon neutral event. However, SD Day event was not occurred in 2016 leading to zero tCO2e.		
Capital goods	Relevant, not yet calculated				Emission information for capital goods such as machinery and equipment are not yet available.
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	420	Latest data for transmission and line losses was 6.9% for Thailand in the year 2011. Data is from pg.3, Annual Report Electric Power In Thailand 2011 by the Department of Alternative Energy Development and Efficiency (accessible from www.dede.go.th). Emissions from scope 2 were 5,666 tCO2e, total emissions before transmission and distribution loss would have been 6,086 tCO2e using the 6.9% figure in 2011. 6.9% of 6,086 tCO2e is 420 tCO2e for transmission and distribution loss.		
Upstream transportation and distribution	Relevant, not yet calculated				Emission information for the transportation of rigs and machinery has not been accounted for.
Waste generated in operations	Relevant, calculated	23493	PTTEP's industrial waste is mainly disposed in two ways: incineration and landfill. By using emission factor for industrial waste for these two disposal methods, we arrived at an estimate of the Scope 3 emissions from waste generation.		
Business travel	Relevant, calculated	10722	1. Activity data: Distance travelled by employees segregated by cabin class and flight classification by short haul or long haul. 2. Emission factors: In the PTT Group standard 3. GWP values: The GWP values from IPCC AR4 were used.		

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Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Employee commuting	Not relevant, explanation provided				Employee commuting is deemed to be not relevant to PTTEP because it is not something that PTTEP can control. Also, due to the use of public transportation by its employees commuting can be difficult to accurately quantify.
Upstream leased assets	Relevant, calculated	41008	PTTEP leases upstream assets, i.e. helicopter, heavy truck, marine vessel for Australia offshore operation.		
Downstream transportation and distribution	Relevant, calculated	6459	1. Activity data: vehicle mileage (segregated by vehicle type and fuel type) and fuel use data separated by fuel type, 2. Emissions factors: The emission factors in the PTT Group standard &API Compendium 2009 are used, 3. GWP values: The GWP values from IPCC AR4 were used.		
Processing of sold products	Not relevant, explanation provided				Crude oil sold by PTTEP is processed at refineries. This is non-applicable to PTTEP since we are in the upstream business, and do not account for downstream emissions. We do not sell our product to the mass consumers therefore there is no end of life treatment for the products sold by PTTEP.
Use of sold products	Relevant, calculated	28886326	1. Activity data: volume of gas sold, which is assumed to be combusted within 2016 2. Emission factors: in the PTT Group Standard (Annex A) 3. GWP Values from IPCC AR4 were used (IPCC 2006, vol.2, ch.1, p.1.18)		Emissions from natural gas combustion by the end user were calculated. It was assumed that all natural gas sold in 2015 was combusted. The volume of natural gas sold was 505,337 mmscf. This data was not previously calculated in PTTEP's Sustainability Report for 2016. Emissions from crude oil are not relevant because it is not combusted directly and must be processed into other products before being used.
End of life treatment of sold products	Not relevant, explanation provided				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,

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Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					therefore there is no end of life treatment for our products
Downstream leased assets	Not relevant, explanation provided				PTTEP does not have any downstream leased assets.
Franchises	Not relevant, explanation provided				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	Not relevant, explanation provided				PTTEP engages in only exploration and production without downstream business and does not provide any financial services. Our company missions and goals are covered only finding petroleum for Thailand. Therefore, this issue is not applicable to our current business model.
Other (upstream)					
Other (downstream)					

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**CC14.2**

Please indicate the verification/assurance status that applies to your reported Scope 3 emissions

Third party verification or assurance process in place

**CC14.2a**

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Annual process	Complete	Limited assurance	<a href="#">2016 Sustainability report.pdf</a>	Page 60 -61	AA1000AS	1

**CC14.3**

Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?

Yes

**CC14.3a**

Please identify the reasons for any change in your Scope 3 emissions and for each of them specify how your emissions compare to the previous year

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment
Fuel- and energy-related activities (not included in Scopes 1 or 2)	Change in physical operating conditions	34.19	Increase	Increase of electric power transmission and line loss in 2016 was due to increasing in GHG scope 2 emission resulted from electrical power accessibility of well sites.
Waste generated in operations	Change in output	32.90	Decrease	Increase of GHG scope 3 from waste generated in operation was due to less amount of waste generated in 2016, especially drilling mud and cutting waste.
Business travel	Emissions reduction activities	33.32	Decrease	Lower GHG scope 3 from business travel in 2016 was due to Save to be Safe Project, i.e. meeting via video conference instead of travel to sites.
Upstream leased assets	Change in physical operating conditions	21.56	Increase	Increase of GHG scope 3 upstream leased assets was due to more marine transportation activities.
Downstream transportation and distribution	Change in output	10.76	Decrease	Decreasing in production volume in 2016 led to less activity of product transportation.
Use of sold products	Change in output	0.10	Decrease	Lower volume of natural gas was sold in 2016.

**CC14.4**

Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? (Tick all that apply)

Yes, our suppliers

**CC14.4b**

To give a sense of scale of this engagement, please give the number of suppliers with whom you are engaging and the proportion of your total spend that they represent

Type of engagement	Number of suppliers	% of total spend (direct and indirect)	Impact of engagement
Collaboration/innovation	90	50%	In 2016, PTTEP promoted supplier collaboration, enhance supply chain management efficiency and strengthen relationships with suppliers via Vendors Symposium and SSHE Contractor Forum. The engaged suppliers and contractors, e.g. construction, drilling, and transports & logistics, etc. have spent greater than 50% of total spend. In addition, PTTEP has set target 50% of office supplies to be green products and services.

**Further Information**

**Module: Sign Off**

**Page: CC15. Sign Off**

**CC15.1**

Please provide the following information for the person that has signed off (approved) your CDP climate change response

Name	Job title	Corresponding job category
Mr. Somporn Vongvuthipornchai	President and Chief Executive Officer	Chief Executive Officer (CEO)

**Further Information**

**Module: Oil & Gas**

**Page: OG0. Reference information**

**OG0.1**

Please identify the significant petroleum industry components of your business within your reporting boundary (select all that apply)

Exploration, production & gas processing

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Oil & Gas

**Page: OG1. Production, reserves and sales by hydrocarbon type - (1 Jan 2016 - 31 Dec 2016)**

**OG1.1**

Is your organization involved with oil & gas production or reserves?

Yes

**OG1.2**

Please provide values for annual gross and net production by hydrocarbon type (in units of BOE) for the reporting year in the following table. The values required are aggregate values for the reporting organization

Product	Gross production (BOE)	Net production (BOE)	Production consolidation boundary	Comment
Conventional non-associated natural gas	128004956	81524765	Operational control and equity share	The gross production was from hydrocarbon produced from all assets under PTTEP operational control. The net production was from the gross production multiplied by percent of equity share.
Associated natural gas				
Natural gas condensate				
Liquefied Petroleum Gas (LPG)				
Light oil				

**OG1.3**

Please provide values for reserves by hydrocarbon type (in units of BOE) for the reporting year. Please indicate if the figures are for reserves that are proved, probable or both proved and probable. The values required are aggregate values for the reporting organization

Product	Country/region	Reserves (BOE)	Date of assessment	Proved/Probable/Proved+Probable
Conventional non-associated natural gas	Thailand	438000000	Sat 31 Dec 2016	Proved
Associated natural gas				
Natural gas condensate				
Natural gas liquids (NGL)				
Light oil				

**OG1.4**

Please explain which listing requirements or other methodologies you have used to provide reserves data in OG1.3. 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. In some cases, reserves may be classified as Proved Reserves essentially when the results from well logging and/or analysing of the core samples can prove that the reservoirs and petroleum in the reservoirs are similar or comparable to those of the neighbouring areas which have already been commercially produced or with the potential to be produced according to their well testing results. In addition, Proved Reserves must be able to be produced by using the existing production equipment or with the scalability to be produced by that of the future.

The Company's Proved Reserves are reviewed annually by our earth scientists and reservoir engineers to ensure the industry's rigorous professional standards. The Proved Reserves are reported on a gross basis which includes the Company's net working interest and related host country's interest. As of December 31, 2016, the total amount of Proved Reserves of PTTEP Group's projects was 170 million stock-tank barrels (MMSTB) of crude oil and condensate, and 3,371 billion standard cubic feet (BSCF) of natural gas or 525 million barrels of oil equivalent (MMBOE). The total amount of Proved Reserves in terms of oil equivalent in consolidation was therefore 695 MMBOE.

**OG1.5**

Please provide values for annual sales of hydrocarbon types (in units of BOE) for the reporting year in the following table. The values required are aggregate values for the reporting organization

Product	Sales (BOE)	Comment
Conventional non-associated natural gas	81050000	
Natural gas condensate	12030000	

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Product	Sales (BOE)	Comment
Liquefied Petroleum Gas (LPG)	800000	
Light oil	23060000	

**OG1.6**

Please provide the average breakeven cost of current production used in estimation of proven reserves

Hydrocarbon/project	Breakeven cost/BOE	Comment
All of PTTEP petroleum products: Crude Oil, Natural Gas, Condensate and LPG.	30.5	The breakeven cost is reported in USD/BOE. PTTEP normally utilizes a 5-year average for Finding & Development (F&D) costs. As the typical exploration to production period range 6 to 8 years before an asset begins production, a 5-year average is an adequate time period to reflect the long-term nature of our business decisions.

**OG1.7**

In your economic assessment of hydrocarbon reserves, resources or assets, do you conduct scenario analysis and/or portfolio stress testing consistent with a low-carbon energy transition?

Further Information

**Page: OG2. Emissions by segment in the O&G value chain - (1 Jan 2016 - 31 Dec 2016)**

**OG2.1**

Please indicate the consolidation basis (financial control, operational control, equity share) used to report the Scope 1 and Scope 2 emissions by segment in the O&G value chain. Further information can be provided in the text box in OG2.2

Segment	Consolidation basis for reporting Scope 1 emissions	Consolidation basis for reporting Scope 2 emissions
Exploration, production & gas processing	Operational Control	Operational Control

**OG2.2**

Please provide clarification for cases in which different consolidation bases have been used and the level/focus of disclosure. For example, a reporting organization whose business is solely in storage, transportation and distribution (STD) may use the text box to explain why only the STD row has been completed

Consolidation bases are the same for all

**OG2.3**

Please provide masses of gross Scope 1 carbon dioxide and methane emissions in units of metric tonnes CO<sub>2</sub> and CH<sub>4</sub>, respectively, for the organization's owned/controlled operations broken down by value chain segment

Segment	Gross Scope 1 carbon dioxide emissions (metric tonnes CO <sub>2</sub> )	Gross Scope 1 methane emissions (metric tonnes CH <sub>4</sub> )
Exploration, production & gas processing	4631491	13504

**OG2.4**

Please provide masses of gross Scope 2 GHG emissions in units of metric tonnes CO<sub>2</sub>e for the organization's owned/controlled operations broken down by value chain segment

Segment	Gross Scope 2 emissions (metric tonnes CO <sub>2</sub> e)	Comment
Exploration, production & gas processing	5666	

Further Information

**Page: OG3. Scope 1 emissions by emissions category - (1 Jan 2016 - 31 Dec 2016)**

**OG3.1**

Please confirm the consolidation basis (financial control, operational control, equity share) used to report Scope 1 emissions by emissions category

Segment	Consolidation basis for reporting Scope 1 emissions by emissions category
Exploration, production & gas processing	Operational Control

**OG3.2**

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Please provide clarification for cases in which different consolidation bases have been used to report by emissions categories (combustion, flaring, process emissions, vented emissions, fugitive emissions) in the various segments

Consolidation bases are the same for all

### OG3.3

Please provide masses of gross Scope 1 carbon dioxide and methane emissions released into the atmosphere in units of metric tonnes CO<sub>2</sub> and CH<sub>4</sub>, respectively, for the whole organization broken down by emissions category

Emissions category	Gross Scope 1 carbon dioxide emissions (metric tonnes CO <sub>2</sub> )	Gross Scope 1 methane emissions (metric tonnes CH <sub>4</sub> )
Combustion	1742597	10
Flaring	2634656	4681
Process emissions	0	0
Vented emissions	491	241
Fugitive emissions	253747	9766

### OG3.4

Please describe your organization's efforts to reduce flaring, including any flaring reduction targets set and/or its involvement in voluntary flaring reduction programs, if flaring is relevant to your operations

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. The GHG reduction projects related to flaring reduction are as follows:

- Flash Gas Recovery Unit at Greater Bongkot South

The project was implemented since 2013. PTTEP was able to recover flash gas from condensate production in Greater Bongkot South accounting for 3.5 MMSCFD which is equivalent to a flare reduction of approximately 120,000 tCO<sub>2</sub>e.

- Flare Gas Recovery Unit (FGRU) at Greater Bongkot North

A Flare Gas Recovery Unit (FGRU) was installed at Greater Bongkot North and has operated since 2007 to reduce flare gas. However, the excessive flash gas is released to the high pressure flare system. Modification for upsizing FGRU compressor's motor was done in 2014. As a result, the FGRU benefits from increased flare gas recovery from 6.74 MMSCFD to 8.52 MMSCFD, equivalent to more flare reduction of 58,000 tCO<sub>2</sub>e.

- Flare gas utilisation at Sirikit Oil Field

The excess gas from the petroleum production process was utilized by selling to Ratchaburi Power Plant for electricity production. Flare reduction can be reduced approximately 16,000 tCO<sub>2</sub>e 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. Estimated flare reduction is of 20,000 tCO<sub>2</sub>e per year.

### Further Information

**Page: OG4. Transfers & sequestration of CO<sub>2</sub> emissions - (1 Jan 2016 - 31 Dec 2016)**

### OG4.1

Is your organization involved in the transfer or sequestration of CO<sub>2</sub>?

Yes

### OG4.2

Please indicate the consolidation basis (financial control, operational control, equity share) used to report transfers and sequestration of CO<sub>2</sub> emissions

Activity	Consolidation basis
Transfers	Operational Control
Sequestration of CO <sub>2</sub> emissions	Operational Control

### OG4.3

Please provide clarification for cases in which different consolidation bases have been used (e.g. for a given activity, capture, injection or storage pathway)

Consolidation bases are the same for all

### OG4.4

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Using the units of metric tonnes of CO<sub>2</sub>, please provide gross masses of CO<sub>2</sub> transferred in and out of the reporting organization (as defined by the consolidation basis). Please note that questions of ownership of the CO<sub>2</sub> are addressed in OG4.6

Transfer direction	CO <sub>2</sub> transferred – Reporting year
CO <sub>2</sub> transferred in	0
CO <sub>2</sub> transferred out	0

#### OG4.5

Please provide clarification on whether any oil reservoirs and/or sequestration system (geological or oceanic) have been included within the organizational boundary of the reporting organization. Provide details, including degrees to which reservoirs are shared with other entities

Montara oilfield project located in Timor Sea, Australia has implemented flare gas injection project of which flare gas produced during the production process is injected into underground reservoirs located in PTTEP concession. This can reduce gas flaring by 7 mmscf which reduces GHG by 150,000 tCO<sub>2</sub>e per year.

#### OG4.6

Please explain who (e.g. the reporting organization) owns the transferred emissions and what potential liabilities are attached. In the case of sequestered emissions, please clarify whether the reporting organization or one or more third parties owns the sequestered emissions and who has potential liability for them

The CO<sub>2</sub> sequestration by flare gas injection project is owned by PTTEP who has all liability for the project as Montara oilfield project is under PTTEP operational control with 100% equity share.

#### OG4.7

Please provide masses in metric tonnes of gross CO<sub>2</sub> captured for purposes of carbon capture and sequestration (CCS) during the reporting year according to capture pathway. For each pathway, please provide a breakdown of the percentage of the gross captured CO<sub>2</sub> that was transferred into the reporting organization and the percentage that was transferred out of the organization (to be stored)

Capture pathway in CCS	Captured CO <sub>2</sub> (metric tonnes CO <sub>2</sub> )	Percentage transferred in	Percentage transferred out
Other: Flare gas from oil production	75000	0%	0%

#### OG4.8

Please provide masses in metric tonnes of gross CO<sub>2</sub> injected and stored for purposes of CCS during the reporting year according to injection and storage pathway

Injection and storage pathway	Injected CO <sub>2</sub> (metric tonnes CO <sub>2</sub> )	Percentage of injected CO <sub>2</sub> intended for long-term (>100 year) storage	Year in which injection began	Cumulative CO <sub>2</sub> injected and stored (metric tonnes CO <sub>2</sub> )
CO <sub>2</sub> injected into a geological formation or saline formation for long-term storage	75000	100%	2016	75000

#### OG4.9

Please provide details of risk management performed by the reporting organization and/or third party in relation to its CCS activities. This should cover pre-operational evaluation of the storage (e.g. site characterization), operational monitoring, closure monitoring, remediation for CO<sub>2</sub> leakage, and results of third party verification

Re-injection system of produced gas is the key feature of the Montara Project. It does not only help maximizing oil, but it is also required to reduce environmental footprint. The flare gas discharged from the re-injection compressor system will be utilized for fuel gas, re-injected back into the gas cap and for artificial lift. Reservoir quality of Montara Field is extremely good in terms of porosity and permeability. 90% of the Original Oil In Place (OOIP) lies within Upper Cycle IV sand reservoir with Net to Gross ratio almost a hundred percent. This ensures CO<sub>2</sub> storage into underground reservoir. Regarding operational monitoring, gas monitoring system is installed at well head of re-injected well and reservoir pressure is controlled.

In order to maintain license to operate of Montara project, Montara Environmental Plan is reviewed, controlled, and audited by a regulator named Natural Offshore Petroleum Safety and Environment Management Authority (NOPSEMA). NOPSEMA regularly conducts environmental inspection and audit as part of its legislated function to implement effective monitoring and enforcement strategies to ensure compliance with petroleum environmental law in which flare re-injection is included.

#### Further Information

**Page: OG5. Emissions intensity - (1 Jan 2016 - 31 Dec 2016)**

#### OG5.1

Please provide estimated emissions intensities (Scope 1 + Scope 2) associated with current production and operations

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Year ending	Segment	Hydrocarbon/product	Emissions intensity (metric tonnes CO2e per thousand BOE)	% change from previous year	Direction of change from previous year	Reason for change
2016	Exploration, production & gas processing	Conventional non-associated natural gas Natural gas condensate Liquefied Petroleum Gas (LPG) Light oil	36.2	0.84	Increase	The slightly increase in intensity (tonne CO2e per thousand BOE) was due to calculation methodology change by using actual site specific data instead of default factor. However, considering emission intensity in terms of tonne CO2e per thousand tonne production, it was decreased comparing with 2015 performance due to implementation of emissions reduction activities, detailed in CC3.3b, including the flare gas recovery projects

**OG5.2**

Please clarify how each of the emissions intensities has been derived and supply information on the methodology used where this differs from information already given in answer to the methodology questions in the main information request

Emission intensities have been derived by using the PTT Group and API Compendium 2009 methodologies. The emission factors used for calculation of GHG emissions in CO2e are derived from IPCC 2006 and Thailand Greenhouse Gas (TGO) studies. This has been referred to in the previous sections of the report already.

**Further Information****Page: OG6. Development strategy - (1 Jan 2016 - 31 Dec 2016)****OG6.1**

For each relevant strategic development area, please provide financial information for the reporting year

Strategic development area	Describe how this relates to your business strategy	Sales generated	EBITDA	Net assets	CAPEX	OPEX	Comment
Exploration and development of new hydrocarbon reserves	PTTEP is a national oil & gas exploration and production company who is committed to providing safe and reliable energy supply.	4189560000	3027000000	18891000000	1100000000	1100000000	These values reported in USD are taken from the 2015 annual report and financial report.

**OG6.2**

Please describe your future capital expenditure plans for different strategic development areas

Strategic development area	CAPEX	Total return expected from CAPEX investments	Comment
Exploration and development of new hydrocarbon reserves	1567000000	5580000000	These values are reported in USD. PTTEP plans to spend 1,567 MMUSD in capital expenditure for 2017 and expects to produce 312 KBOED in 2017. Assuming an average price of \$49 per barrel, our expected return from capital expenditure is 5,580 MMUSD for the year 2017. In addition, PTTEP has developed 5 years investment plan (2017 -2021). Total CAPEX for 5 years plan is 6,236,000,000 MMUSD.

**OG6.3**

Please describe your current expenses in research and development (R&D) and future R&D expenditure plans for different strategic development areas

Strategic development area	R&D expenses – Reporting year	R&D expenses – Future plans	Comment
	14000000	15000000	

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Strategic development area	R&D expenses – Reporting year	R&D expenses – Future plans	Comment
Exploration and development of new hydrocarbon reserves			These values are reported in USD. PTTEP has planned to invest in Knowledge Management amount of at least 3% of annual net profit. Knowledge management, including new technologies and capability of the Company’s research and development program, is developed to be in line with the Company’s growth strategy. The Capability and Technology Development Roadmap was created as well as research on technology to support business growth in 3 areas which are focused to increase exploration success, enhance more production, and develop green practice.

**Further Information**

**Page: OG7. Methane from the natural gas value chain**

**OG7.1**

Please indicate the consolidation basis (financial control, operational control, equity share) used to prepare data to answer the questions in OG7

Segment	Consolidation basis
Exploration, production & gas processing	Operational Control

**OG7.2**

Please provide clarification for cases in which different consolidation bases have been used

The consolidation bases are the same for all

**OG7.3**

Does your organization conduct leak detection and repair (LDAR), or use other methods to find and fix fugitive methane emissions?

Yes

**OG7.3a**

Please describe the protocol through which methane leak detection and repair, or other leak detection methods, are conducted, including predominant frequency of inspections, estimates of assets covered, and methodologies employed

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, Outcomes from the survey shall 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.

**OG7.4**

Please indicate the proportion of your organization’s methane emissions inventory estimated using the following methodologies (+/- 5%)

Methodology	Proportion of total methane emissions estimated with methodology	What area of your operations does this answer relate to?
Direct detection and measurement		
Engineering calculations		

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Methodology	Proportion of total methane emissions estimated with methodology	What area of your operations does this answer relate to?
Source-specific emission factors (IPCC Tier 3)		
IPCC Tier 1 and/or Tier 2 emission factors	>75%	Other: All assets under PTTEP operational control.

**OG7.5**

Please use the following table to report your methane emissions rate

Year ending	Segment	Estimate total methane emitted expressed as % of natural gas production or throughput at given segment	Estimate total methane emitted expressed as % of total hydrocarbon production or throughput at given segment
2016	Exploration, production & gas processing	0.10 %	0.07%

**OG7.6**

Does your organization participate in voluntary methane emissions reduction programs?

Yes

**OG7.6a**

Please describe your organization’s participation in voluntary methane emissions reduction programs

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 addition, PTTEP has developed our own methane leak detection and repairing program for both onshore and offshore operating assets in Thailand, Myanmar and Australia. The methane leak mitigation and action plan is developed for each assets to reduce methane emission.

**OG7.7**

Did you have a methane-specific emissions reduction target that was active (ongoing or reached completion) in the reporting year and/or were methane emissions incorporated into targets reported in CC3?

Yes, methane emissions were incorporated into targets reported in CC3

**OG7.7b**

If methane emissions were incorporated into targets reported in CC3 (but not detailed as a separate target), please indicate which target ID(s) incorporate methane emissions, and specify the portion of those targets that is comprised of methane

The methane emissions are incorporated into GHG target which is 20% intensity reduction by 2020 from 2012 base year (Target ID is Int-1 in CC3.1b). The GHG target is set in term of tonne CO2 equivalent which includes carbon dioxide, methane, nitrous oxide, HFCs and SF6. Based on 2016 performance, the methane emission is about 337,000 tCO2e which is equivalent to 7.3% of total GHG emission. This implies methane emission target of 1.5% intensity reduction by 2020.

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