

INTEGRATED
REPORT 2019

THAI OIL PUBLIC
COMPANY LIMITED



Driving Transformation through
**SUSTAINABLE
EXCELLENCE**

- Ⓔ environment
- Ⓕ social
- Ⓖ governance

About This Report

Thai Oil Public Company Limited is committed to disclose all material information on corporate sustainability to our stakeholders with the utmost accuracy and transparency. In line with this commitment, we have been publishing annual corporate sustainability reports aligned with international standards since 2011. This report is the 9th of its kind, and covers our economic, social, and environmental performance from 1st January to 31st December 2019.

Approach to Reporting

The 2019 Integrated Report follows the International <IR> Framework of the International Integrated Reporting Council (IIRC), and covers sustainability issues selected through a materiality assessment process. This Report has been prepared in accordance with the GRI Standards: Core Option, with additional indicators for the Oil and Gas Sector Disclosures (OGSD) on pages 126-129. The Report also included the progress of the United Nations Global Compact 10 Principles on page 129 and the progress towards the United Nations Sustainable Development Goals (SDGs) on pages 130-134.



Scope of Reporting

The scope of reporting has been determined based on business relevance, readiness of comprehensive and accurate information, and level of impacts towards Thailoil's core businesses - oil refining, petrochemical production, lube base oil business, power generation, transportation, and other businesses.

The scope of reporting on occupational health and safety (OHS) and environmental performance covers:

- Thai Oil Public Company Limited (TOP);
- Thai Lube Base Public Company Limited (TLB);
- Thai Paraxylene Company Limited (TPX);
- Thailoil Energy Services Company Limited (TES);
- Thailoil Power Company Limited (TP);
- LABIX Company Limited (LABIX);
- TOP SPP Company Limited (TOPSPP);

The performance of TOP Solvent Company Limited (TS) has also included in topic innovation and customer stewardship.

In total, this determined scope of reporting covers 97% of total Thailoil Group's sales revenues.

To download an electronic version of the 2019 Integrated Report, please visit:
https://www.thaioilgroup.com/home/media_ebook.aspx?id=273



For information on performance of Thailoil Group companies not included in the scope of this Report, please refer to the 2019 Annual Report at <https://investor-th.thaioilgroup.com/ar.html>



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✉ sustainability@thaioilgroup.com

MESSAGE TO OUR STAKEHOLDERS



Thaioil Integrated Report 2019 was prepared to communicate relevant information to stakeholders who are interested in the business activities and performance of Thaioil and its subsidiaries.

In developing this Integrated Report, Thaioil has followed the Integrated Reporting <IR> Framework of the International Integrated Reporting Council (IIRC), which offers a guidance for companies to communicate the integration of strategy, work processes, and sustainability performance through effective management of the 6 capitals: financial capital, manufactured capital, natural capital, human capital, intellectual capital, and social and relationship capital. Through this reporting, we demonstrate our ability to sustainably create value within the organization and for stakeholders in the long-term.

A handwritten signature in black ink, appearing to read 'Wirat Uanarumit', written in a cursive style.

Mr. Wirat Uanarumit

President and Chief Executive Officer
Thai Oil Public Company Limited

Over the past year, the oil industry has faced multiple challenges from various external factors. The international oil price fluctuations resulting from the surplus supply and the trade conflict between two global superpowers - the United States and China - were particularly impactful to the industry. We also faced a changing context in environmental aspects and new, more stringent regulations, such as the new regulations of the International Marine Organization (IMO) regarding marine fuel oil, which will require oil refineries across the world to make major changes in how they conduct their business. Other external factors affecting the industry include changes in consumer behavior, the development of digital technology, the electric vehicle (EV) market, and changes in demography towards an aging society. All of these factors have an impact on sales revenue, and require businesses to adapt, both in managing the overall quantity of production and in search for new products, in order to meet the needs of the market and secure future business growth.

Thaioil has realized the impacts of the aforementioned challenges, and is driven to adapt and increase the efficiency of our work processes. We have developed a long-term business strategy to determine the path we want to take, from the present up to 2030, which will allow us to maintain our position as the leading oil refinery in the region. Along with creating values for society and the environment that aligns with an organization's vision to "empower human life through sustainable energy and chemicals".

Thaioil has adjusted our investment direction according to the new business strategy in order to manage investment risks and adapt to trends of the global energy demand. This consists of 3 main strategies:

Strengthen the core

businesses in oil refining and power generation by focusing on supporting the energy security of Thailand and facilitating growth in energy demand in Southeast Asia.

Value chain enhancement

to downstream businesses such as our petrochemical business, chemical distribution business, specialty products business, and marine transportation business in order to maintain competitive advantage and expand into new markets.

Seed the options

through investing in corporate venture capital (CVC) funds and startup businesses in both Thailand and abroad, specifically focusing on investments in business groups outside the core business in order to manage risks, generate research and development (R&D) opportunities, and further develop towards future alternative businesses.

In addition to the long-term strategies, Thaioil has been preparing for the challenges arising from internal factors – operating the Clean Fuel Project and expanding our refinery production

capacity from 275,000 barrels per day to 400,000 barrels per day by 2023. To successfully accomplish these tasks, Thaioil must manage our human capital such that we can effectively make use of the modern day technology that will facilitate production process. We also face with challenges in managing occupational health and safety risks of workers and contractors in the work area. All of these factors require Thaioil to have adequate management systems and measures to prevent and mitigate the potential impacts that may occur in the present or in the future.

Furthermore, Thaioil is committed towards continuously improving our operational system. We achieve this through a management system that strives for operational excellence. This management system integrates our different business units, including our oil refinery business as well as other businesses such as our petrochemicals business and our lube base oil business, through specifically ensuring the production plan of each business unit complements each other. As a step towards digital transformation, we have applied digital technology to support different processes. Examples include using data management to create an integrated platform for oil refining activities and using online systems in our supply chain practices. Digital transformation ultimately helps us to increase the speed and accuracy of our work. We have also invested in infrastructure improvements, including our product storage and engineering building, the operating room building, the Jetty No. 7-8 areas, and the Energy Recovery Unit (ERU), to support our business expansion.

Additionally, Thaioil has increased channels of communication with stakeholders. We have recently set up the Clean Fuel Project (CFP) Support Center to function as the center for managing CFP-related activities, including community complaints, in accordance with the expected standards. We believe this is necessary to ensure that our activities do not create adverse social and environmental impacts, and to ultimately secure community

acceptance and fulfil our "Refinery in the City" vision of being a refinery that sustainably thrives alongside communities.

Through transforming our business activities according to our new business strategy and continuously improving upon our management system, Thaioil's oil refinery operations achieved high efficiency in 2019. Despite the annual turnaround, our refinery capacity could run 107% of total nameplate capacity, contributing to a total of 362,179 million THB in sale revenues. Thaioil also reduced energy consumption by 1.4 million gigajoules and greenhouse gas emissions by 84,265 tons carbon dioxide equivalent. Furthermore, we have expanded solvents business to other ASEAN countries, including Myanmar, Indonesia, and northern Vietnam. Revenues from this product group amounted to 9,102 million THB. We have also started investing in corporate venture capital (CVC) projects to seek new opportunities in developing hydrocarbon technologies and technologies that reduce environmental impacts. Currently, we have invested in a total of 1 CVC fund in the United States.

Thanks to the hard work of our employees and managers in all levels to drive our organization towards sustainability, Thaioil has been member of the Dow Jones Sustainability Indices (DJSI) for the 7th consecutive year, and recognized as the Oil and Gas Refining and Marketing Industry Leader in 2019. This achievement is rewarding for us, and inspires us to continue advancing our sustainability performance.

Finally, on behalf of Thaioil Group, I would like to thank every party for the support that allows Thaioil to conduct our business and grow sustainably. I strongly believe that the determination and genuine dedication of all parties in the business, with consideration of the benefits to the environment, the economy, and society, will lead Thaioil in continuing to empower human life through sustainable energy and chemicals.

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Financial Highlights

Sales Revenue

2562	362,179	Million THB
2561	389,042	Million THB

EBITDA

2562	13,833	Million THB
2561	20,239	Million THB

Net Profit/(Loss)

2562	6,277	Million THB
2561	10,149	Million THB

Basic Earnings/(Loss) per Share

2562	3.08	THB/Share
2561	4.97	THB/Share

Total Assets

2562	283,445	Million THB
2561	268,613	Million THB

Total Equity

2562	123,924	Million THB
2561	126,472	Million THB

Dividend Payment

2562	1.50	THB/Share
2561	2.65	THB/Share

Market Capitalization

2562	139,252	Million THB
2561	177,238	Million THB

Sustainability Highlights

Human Capital

278 average training hours per person per year

1,302 employee volunteers and a total of **10,416** volunteer hours

1.16 employee voluntary turnover rate

Intellectual Capital

381 applied knowledge, valued to business
2,174 million THB

96 innovative ideas raised by employees valued at **1,025** million THB

3.1 million THB earnings from commercialized innovation

Social and Relationship Capital

93.32% community engagement

96% customer engagement

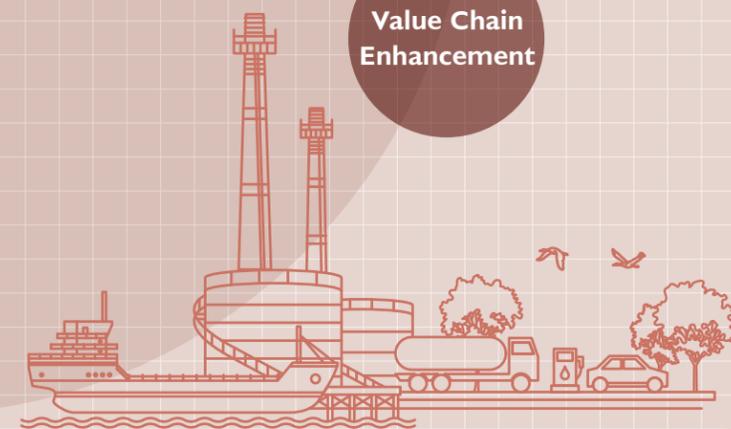


Sustainable Value Creation

Value Protection



Value Chain Enhancement



Social and Relationship Capital

Zero case of corruption and fines

Human Capital

0.37 total recordable injury rate per million workhours

Manufactured Capital

Infrastructure of Clean Fuel Project

Approximately **300,000** tons per year of carbon credits registered at the Thailand Greenhouse Gas Management Organization (TGO) between 2018-2024

Financial Capital

Total assets **283,445** million THB

Total equity **123,924** million THB

Sales revenue **362,179** million THB

EBITDA **13,833** million THB

Net profit **6,277** million THB

Natural Capital

84,265 tons of carbon dioxide equivalent reduced as a result of GHG emissions reductions from energy efficiency improvement initiatives in 2019

Natural Capital

842,699 tons of carbon dioxide equivalent reduced as a result of avoided emission products sold (i.e. gasohol and biodiesel)

Financial Capital

30% share of avoided emission product sales revenues in portfolio

Manufactured Capital

Investments in **1** CVC fund in USA

Social and Relationship Capital

93% supplier satisfaction

Manufactured Capital

107% refining capacity

Solvents business units that have expanded in ASEAN, including the Republic of the Union of Myanmar, Indonesia, and northern Vietnam

Natural Capital

83.7 Energy Intensity Index of refinery and power plants

2.45% reduction in freshwater withdrawal

2.55% reduction in water discharge



About Thairoil Group



Group Overview - Thaioil and Subsidiaries



**THAI OIL PUBLIC
COMPANY LIMITED**

Thai Oil Public Company Limited, the largest petroleum refinery business in Thailand, has been operating for 58 years. We have a modern and highly efficient production process that allows us to produce and distribute refined petroleum, and mainly support the domestic petroleum demands. Furthermore, Thaioil extends our value chain to include upstream and downstream businesses in order to maintain business stability.

Vision

Empower human life through sustainable energy and chemicals

Mission

To enrich stakeholders' well-being and deliver sustainable returns built upon innovation, technology and resilient portfolio with top class management and accountable corporate governance

Corporate Values



- Professionalism
- Ownership and Commitment
- Social Responsibility
- Integrity
- Teamwork and Collaboration
- Initiative
- Vision Focus
- Excellence Striving

Headquarter : **Bangkok, Thailand**

Listed Date in the Stock Exchange of Thailand : **October 9, 2004**

Registered Capital : **20,400,278,730 Baht**

Percentage of shares owned by PTT PLC. : **47.53%**

Refinery Production in 2019
Approximately :

295,261 BBL per day

107% of nameplate capacity at 275,000 BBL per day

Domestic Distribution

30% of total domestic finished oil production

Location of operations :

Thailand, Vietnam, Singapore, Indonesia, and Myanmar

THAIOIL'S VALUE CHAIN AND MARKET OUTLOOK 2019

Jetty Expansion Project for Jetties 7 and 8 to increase flexibility and efficiency in product distribution (Ongoing)

Marine Fleet Expansion Project to meet customers' demand; and expand the business to new international markets (Under feasibility study)

Clean Fuel Project to increase the total refining capacity to 400,000 barrels per day and adjust the proportion of diesel and jet fuels, while ceasing production of fuel oils, to respond to market conditions. Along with increasing capacity to produce specialty products that meet specific standards, such as the EURO 5, to reduce environmental impacts (Ongoing)

Crude Oil Tank Construction (Completed)

Steam and Power Plant Project in Sriracha to replace small power plant (SPP) as the power purchase agreement of Thaioil Power Company Limited is coming to end (Under feasibility study)

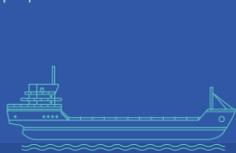
Investment in Petrochemical Business Project (Under feasibility study)

Solvent and Chemical Distribution Center Expansion Project in Southeast Asia (Under feasibility study)

Expanding Distribution Center to Indonesia Project (Completed)

Feasibility Study on Environmental-Friendly Business (Under feasibility study)

Sriracha Buildings Project, including the engineering and warehouse buildings (completed), product testing laboratories (completed), and office buildings (ongoing)



01

Transportation

Business activities that support marketing, primarily consisting of international marine transportation of petroleum and petrochemical products, with small, medium, and large oil and petrochemical products tankers.

Petroleum Transportation Industry

The domestic demand for marine transport of petroleum and petrochemical products has decreased as a result of turnarounds in various refineries, along with the slowdown in the global and regional economies, which together affecting the demand for crude oil tankers in the region and freight rates.

At the same time, international trade conflicts, sanctions on Chinese tankers and sanctions on Iranian oil exports, have resulted in an increase in the use of very large crude carriers (VLCC) for floating storage.

Meanwhile, demand for crew boats to support crude oil exploration and drilling operation is expected to increase marginally.

02

Oil Refinery

Core business with the refining capacity of 275,000 barrels per day.

Crude Oil Market and Refining Industry

The average crude oil price in 2019 was approximately 63.5 USD per barrel, a reduction from 69.7 USD per barrel in 2018, due to a decline in oil demand following the global economic slowdown.

The refining industry is expected to shrink, with the benzene market having supply stabilization at high levels, and the diesel and jet fuels market seeing increased pressure from declining demand growth rates resulting from economic conditions. At the same time, the price difference between high sulfur fuel oil and crude Dubai oil has decreased by high margins as a result of the International Convention for the Prevention of Pollution from the Ships (MARPOL) of the International Maritime Organization (IMO) coming into action.

Domestic Market for Petroleum Products

Domestic demand for petroleum products expanded by 1%, and the average production of oil refineries within Thailand in 2019 was at 911,339 barrels per day, a reduction from 1,002,720 barrels per day in 2018. This is a result of the annual shutdown for maintenance. Nonetheless, compared to other refineries, Thaioil is still the largest producer in Thailand, with a share of 30% of total domestic production.

03

Power and Steam

Extended business activities that strengthen business stability, primarily consisting of natural gas-fired co-generation power plants, with the generated electricity and produced steam are used within Thaioil Group and other areas of operations, respectively.

Power Industry

The total domestic power capacity installed in 2019 (excluding independent power supply capacity, or IPS) was 47,260 MW, an increase of 5% compared to 2018.

While, the overall domestic power consumption for the first 9 months of 2019 was 4.3% higher compared to the same period in 2018. This is due to the increase in power consumption by households and business, and rising global temperatures. Meanwhile, the industry sector reduced power consumption as a result of the U.S.-China trade war, which in turn reduced export demand. The domestic peak power consumption in 2019 was recorded at 32,273 MW.

04

Petrochemicals

Business activities that utilize the by-products to add value within the oil refining value chain, consisting of the production of aromatics and linear alkyl benzene (LAB).

Aromatics Market

The paraxylene market weakened as a result of additional supply from several new petrochemical production plants in China and Brunei, which together led to a historic increase in supply of 6.1 million tons per year, and an eventual state of oversupply in the latter half of the year. Meanwhile, demand grew by approximately 2.3 million tons per year, a reduction from 3.7 million tons per year growth in 2018.

The benzene market weakened as a result of cumulative oversupply, with the global benzene supply having increased by 2.1 million tons, while demand grew by only 1.1 million tons as a result of downstream businesses being affected by the U.S.-China trade war.

Linear Alkyl Benzene (LAB) Market

LAB prices fell in response to the decline in catalysts prices, which received pressure from falling global oil prices. However, price differences between LAB and catalysts have increased due to demand in the Asian region, which has continued to grow in line with population growth and increase in quality of life of developing countries.

05

Lube Base

Business activities that utilize the by-products to add value within the oil refining value chain, consisting of the production of lube base oil, bitumen/asphalt, and treated distillate aromatics extract (TDAE).

Lube Base Oil and Bitumen Market

The lube base oil market weakened due to increased pressure from additional supply of Group II and Group III lube base oil from new refineries in the Asian region – especially in China, Bangladesh, and Singapore – which increased production by 2.3 million tons.

The bitumen market in Asia has improved as a result of demand growth following national economic development plans in the region, increased price differences between bitumen and high sulfur fuel oils, as well as reduced fuel oil prices as a result of preparation for IMO in 2020.

06

Solvents

Business activities relating to the distribution of by-products from the refinery to joint venture companies to produce solvents and distribute to markets in Thailand and Asia-Pacific.

Solvent Market

In 2019, the Thai economy and global economy both experienced slowdowns. For the solvent market, the economic slowdown translated into a reduction in demand for solvent products in various industries. At the same time, the solvent market has been in a state of over supply both in Thailand and overseas since 2018. For Thailand, the economic slowdown resulted in overall reduction in solvent consumption and increasingly intense price competition. However, the market in Vietnam – also a manufacturing base for products to be sold in the United States – has grown by leaps and bounds, with a notable increase in solvents and chemical products sales in 2019.

07

Ethanol

Business activities that support the production and use of renewable energy through three joint venture companies.

Ethanol Industry

Domestic demand for ethanol for gasohol has continued to increase, and is currently at 4.4 million litres per day – an increase of 6.5% from 2018. This is a result of increasing use of gasoline. However, there is currently an over supply of ethanol in the Thai market due to high levels of ethanol production from molasses, combined with increasing proportion of cassava used in ethanol production.

08

Other Supporting Businesses

Other supporting businesses include:

- Recruitment
- Financial Management Services
- Social Enterprise
- Digital and Communications
- Engineering Expertise

09

New Opportunities Business

Business activities relating to investments in corporate venture capital funds to capture new business opportunities in new industries (step out) and support new business expansion (new s-curve).

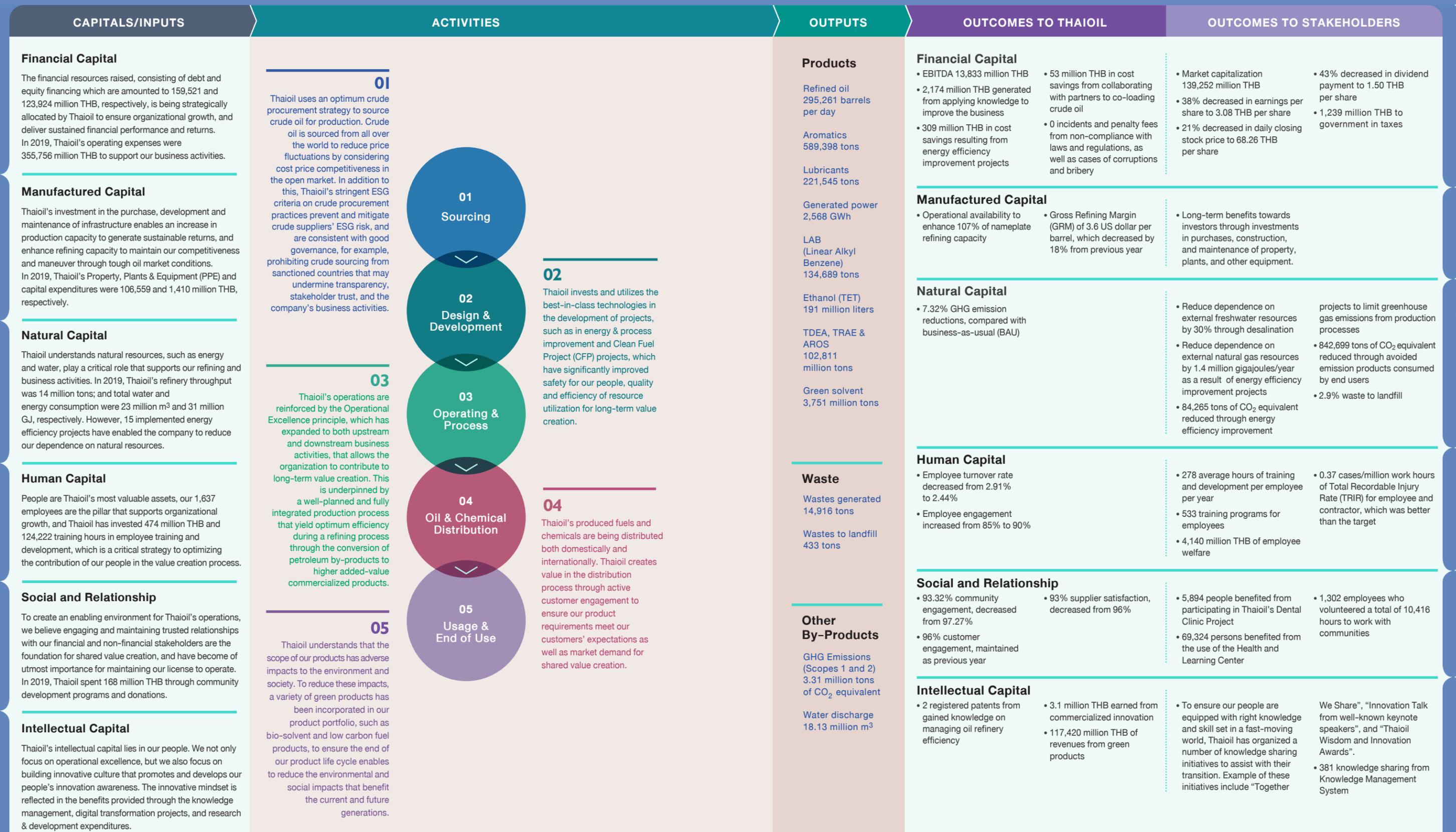
In 2019, the petroleum and petrochemicals industry faced challenges from various external factors, especially global oil price volatility that resulted from over supply in the market and the trade conflict between global economic superpowers, as well as the legal environment with increasingly stringent environmental laws and regulations, the changing context of consumer behavior, developments in digital technologies, the growing electric vehicle market, and demographic changes towards an aging society. All of these factors together have called on oil producers across the world to make fundamental changes in how they operate.

With our core business activity in oil refining and our value chain extended towards upstream and downstream businesses to secure business stability, Thaioil has to regularly evaluate market conditions and continuing prepares appropriate countermeasures.

Business Model

Thaioil's 2019 business strategy outlines our path towards sustainable development, which consists of strengthening our core businesses in energy, enhancing our value chain through expanding our petrochemicals and specialty products businesses, and increasing our business capabilities through technology and innovation. Integrated within this strategy is our dedication to sustainably create shared value for our stakeholders in three strategic priorities – value protection, value enhancement, and sustainable value creation. These three priorities will lead us towards good revenues while also creating value for communities, society, and the environment.

Thaioil's business activities rely on financial inputs as well as non-financial inputs, such as our assets, natural resources, property, plants and equipment, human capital, support from stakeholders, license to operate, brand value, technology, and information systems. All these inputs and capitals are managed through Thaioil's business activities to create value for the business and our stakeholders. While outputs such as products, services, and wastes released are outputs directly related to our business, our activities also create outputs that reflect shared value for communities, society, and the environment. At the same time, some of the outcomes created in our activities are key factors to driving our business forward and securing the future creation of value. For example, current investments in developing the skills and capabilities of our employees in technology and innovation can lead to future solutions for more production efficiency.



Frequency	Approach	Shareholders/ Creditors/ Financial Institutions	Customers	Suppliers/ Contractors	Employees	Community/ Society	Government and related public agencies
Quarterly	Meeting	<ul style="list-style-type: none"> Meeting with analysts and rating agencies 			<ul style="list-style-type: none"> "CEO Update" Forum 		
	Survey	<ul style="list-style-type: none"> Feedback survey 				<ul style="list-style-type: none"> Survey on feedback for activities 	
	Press release	<ul style="list-style-type: none"> Press release on business performance 					<ul style="list-style-type: none"> Press release on business performance
Bi-Monthly	Pamphlets					<ul style="list-style-type: none"> Pamphlets 	
Monthly	Meeting		<ul style="list-style-type: none"> Meetings with customer representatives 		<ul style="list-style-type: none"> Management meetings with employee representatives, such as the welfare committee, employee committee 	<ul style="list-style-type: none"> Meetings with community leaders Meetings between Thailoil, government agencies, and communities 	<ul style="list-style-type: none"> Meetings with representatives from government and relevant public agencies Meetings between Thailoil, government agencies, and communities
	Newsletters and online news	<ul style="list-style-type: none"> Newsletters or online news 	<ul style="list-style-type: none"> Newsletters or online news 		<ul style="list-style-type: none"> Newsletters or online news 		
Weekly	Newsletters and online news		<ul style="list-style-type: none"> Newsletters or online news 		<ul style="list-style-type: none"> Newsletters or online news 		
Always Accessible	Engagement Activities	<ul style="list-style-type: none"> Post-event engagement for feedback Participation in at least 4 events organized by the Stock Exchange of Thailand (SET) per year 8-10 Exhibitions, seminars, and roadshows for investors (both domestic and foreign investors) per year 	<ul style="list-style-type: none"> Customer engagement during ceremonies and festivals Engagement for feedback 	<ul style="list-style-type: none"> Activities promoting workplace safety, such as providing awards for outstanding supplier performance 	<ul style="list-style-type: none"> Employee visits conducted by people management function to have conversations Communicating through digital platform 	<ul style="list-style-type: none"> Visiting communities with project partners Community development projects, such as school activities and community activities Communicating through social media and digital platform 	
	Grievance Mechanisms	<ul style="list-style-type: none"> Hotline TOP IR Application Investor Relations Function CG Email Corporate Grievance Channel 	<ul style="list-style-type: none"> Hotline Online customer complaint channel Customer Relations function CG Email Corporate Grievance Channel 	<ul style="list-style-type: none"> Supplier Relations Function CG Email Corporate Grievance Channel 	<ul style="list-style-type: none"> Hotline Labour Union Relations Function CG Email Corporate Grievance Channel 	<ul style="list-style-type: none"> Hotline Community Relations Function CG Email Corporate Grievance Channel 	<ul style="list-style-type: none"> Government Affairs Function CG Email Corporate Grievance Channel

Thaioil Group's Materiality Assessment Process

Thaioil reports material sustainability matters to our organization and stakeholders in accordance with the GRI (Global Reporting Initiative) Standards as well as value creation concept in materiality matters of International Integrated Reporting Council (IIRC). The process presented in this Report has also been externally verified.

Thaioil's Materiality Assessment Process



In 2019, Thaioil assessed material sustainability matters through conducting interviews with representatives from internal functions responded for each stakeholder group. The interview process is conducted to ensure that the identification and prioritization of the materiality of the sustainability matters reflect the business context and the viewpoints of the six stakeholder groups. To collect data with internal stakeholders, Thaioil reviewed results of the materiality assessment from the previous year with our core business groups, and collected additional information through in-depth interviews with representatives from other business groups. This included a total of three managing directors representing TOP Solvent Company Limited, Thaioil Marine Company Limited, and Sakchaisit Company Limited. To collect data from external stakeholders, Thaioil conducted in-depth interviews with the representatives of six company departments that have direct communication with stakeholders.

Step 1: Identification of material matters

In 2019, Thaioil identified material sustainability issues through analyzing both internal and external drivers. **Internal drivers** reflect results of our SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis, our short-term, medium-term, and long-term business strategic direction, our corporate risk profile, and materiality assessment results from the previous year. **External drivers** reflect issues of interest communicated by the Dow Jones Sustainability Indices (DJSI), the United Nations' Sustainable Development Goals (SDGs), and national and global trends as identified by reputable organizations, such as the World Economic Forum (WEF). Upon compiling these internal and external drivers, we then integrate identified sustainability matters with results from stakeholder interviews mentioned above.

Step 2: Prioritization of material matters

Thaioil prioritizes material sustainability matters for the year 2019 through assessing the importance of each issue identified by interviewed stakeholders, other oil and gas peers, and sustainability assessment standards. Scoring was done on a scale of 1-7. Each material matter was then prioritized based on two dimensions:

- 1 Impact and importance to Thaioil's ability to create value, and
- 2 Impact and importance to stakeholder.

Step 3: Validation of material matters

Sustainable Development function was the first line to review and validate the results of prioritized material matters. Then, the results were presented to the Sustainable Development Committee in a meeting attended by management executives and chaired by the CEO for a final review and endorsement. Finally, Thairoil grouped together material matters that were similar, such that the 27 material matters were consolidated to 9 material matters.

Additionally, an external independent verifier was invited to ensure that the materiality assessment process, stakeholder engagement process, and the collection and compilation of data related to our safety and the environment performance were all done with accuracy and completeness. The assurance statement is presented on page 124-125.

Results of 2019 Materiality Assessment

The 2019 materiality assessment found that both internal and external drivers have impacted on the expectations of stakeholders, as well as direct positive and negative impacts on stakeholders and Thairoil's ability to create long-term value. Thairoil's internal business changes in developing the Clean Fuel Project (CFP) especially has likewise affected stakeholders' expectations, specifically focusing on establishing stricter standards to be implemented in the context of business expansion, such as environmental management, occupational health and safety, and corporate governance. Additionally, stakeholders have increased expectations concerning Thairoil's ability to manage

business transition risks associated with the oil and gas industry. This increased the relevance of innovation and product stewardship as material matters that will affect Thairoil's ability to create long-term value. Most of these expectations have to do with business continuity and Thairoil's ability to continuously create value without facing business disruption for our stakeholders despite the context of changes. In order to appropriately understand the material matters and adequately manage them, Thairoil has grouped the material matters into three themes, similar to the previous year, and reported below in detail as follows:



**Material Matters
for Value Protection**



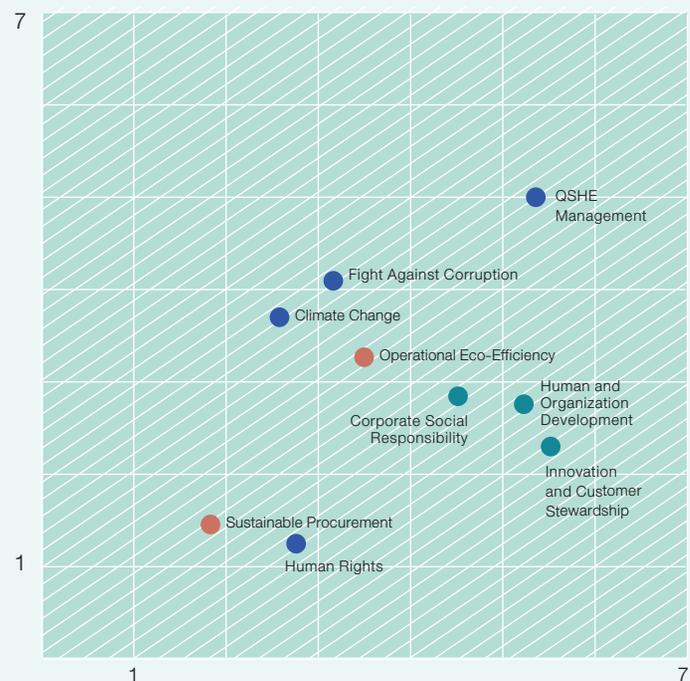
**Material Matters
for Value Enhancement**



**Material Matters
for Sustainable Value Creation**

Remarks: * In 2019, there was no restatement of previous year performance (102-48).
** In 2019, Thairoil changed the method used to assess impact and importance, from a scale of 1-5 used in 2018 to a scale of 1-7.

✓ Impact and Importance to Stakeholder



➤ Impact and Important to Business's Ability to Create Value

Materiality Assessment Results

Operating Context	Risks, Opportunities, and Impacts	Stakeholder Viewpoints and Expectations	Related Material Sustainability Matters	Business Strategies Related to the Management of Material Sustainability Matters			Additional Information Regarding Management Approach
				Strengthen the Core	Value Chain Enhancement	Seed the Options	
Climate change	<ul style="list-style-type: none"> Natural disasters and temperature fluctuations that may lead to business disruption Impacts of physical risks from climate change on water resources Greenhouse gas reduction policies, including controls on GHG emissions and environmental management policies, that will lead to a more stringent regulatory environment and potential business costs in the case of noncompliance with new laws and regulations Technological changes driving towards the use of alternative energy as replacement for oil, which is likely to occur rapidly and will impact the energy industry, as well as the enforcement of various regulations that would promote alternative energy usage instead of oil, which may impact long term revenue and business growth Investment opportunities in new businesses that reduce the impacts of climate change 	<ul style="list-style-type: none"> Shareholders/creditors/ financial institutions expect Thairoil to report the approach for adapting business and using innovation to confront the challenges in the next 10-15 years, especially the risks from changes in the oil and gas industry. PTT, the majority shareholder, expects that Thairoil will operate according to strategies relating to PTT Group's environmental strategy The government and related public agencies expect that Thairoil will invest in environmental projects, such as environmentally friendly fuels and renewable energy, to support the achievement of Thailand's national GHG emission reduction targets. Communities expect that Thairoil's corporate social responsibility strategy will include renewable energy projects. 	 Climate Change Risk	⊙	⊙	⊙	pp. 48-51
			 Quality, Safety, Health, and Environment (QSHE) Management	⊙			pp. 32-41
			 Innovation and Customer Stewardship	⊙	⊙	⊙	pp. 78-85
Operational Eco-Efficiency	<ul style="list-style-type: none"> The movement towards the circular economy, as seen in the agenda from the Thai government and foreign governments, in initiatives such as increased recycling and the ban on single-use plastics, may increase costs for businesses if they do not operate in compliance with new laws and regulations 	<ul style="list-style-type: none"> Shareholders/creditors/ financial institutions expect Thairoil to continuously improve energy efficiency. PTT, the majority shareholder, expects that Thairoil will operate according to strategies relating to PTT Group's environmental strategy 	 Operational Eco-Efficiency	⊙	⊙		pp. 60-67
			 Climate Change Risk	⊙	⊙	⊙	pp. 48-51

Operating Context	Risks, Opportunities, and Impacts	Stakeholder Viewpoints and Expectations	Related Material Sustainability Matters	Business Strategies Related to the Management of Material Sustainability Matters			Additional Information Regarding Management Approach
				Strengthen the Core	Value Chain Enhancement	Seed the Options	
Operational Eco-Efficiency (Continued)	<ul style="list-style-type: none"> Social and consumer trends that move towards the circular economy create expectations on businesses to reduce environmental impacts throughout the product life cycle, which may create impacts on reputation, revenues, and long-term business growth Movements in the private sector towards becoming the leader in the circular economy movement may impact the ability to compete Thaioil's business expansion, which will result in more resource consumption and waste generation, and will create more challenges to address and manage these issues The opportunity to change business operations to be in line with the circular economy and to reduce costs 	<ul style="list-style-type: none"> Suppliers/contractors expect Thaioil to promote supplier environmental, social, and governance performance, in line with Thaioil's policies. The government and related public agencies expect Thaioil to manage energy efficiency to support the country in achieving GHG reduction targets. They also expect that Thaioil will reduce impacts on air quality, which could lead to other business opportunities, such as the Euro 5 fuel products. Communities expect that Thaioil will promote the knowledge of energy in order to support sustainable standard of living. 	Innovation and Customer Stewardship	⊙	⊙	⊙	pp. 78-85
			Sustainable Procurement	⊙	⊙		pp. 68-75
			Corporate Social Responsibility	⊙			pp. 96-111
Human rights and business expectations	<ul style="list-style-type: none"> National and global developments related to business and human rights, and the approval of the National Action Plan on Business and Human Rights in Thailand on October 2019, which may affect Thaioil in the event of noncompliance with new policies and expectations for the business sector Thaioil's business expansion, which will require additional labour and may affect on nearby communities, and the social license to operate 	<ul style="list-style-type: none"> Shareholders/creditors/financial institutions and the government and related public agencies who expect that Thaioil will respect human rights and maintain community engagement, especially during business expansion, to preserve the social license to operate. Employees expect Thaioil to manage labour issues appropriately and equitably. Suppliers/contractors expect Thaioil to support capacity building relating to their environmental, social, and governance performance. Communities expect Thaioil to conduct community engagement with a process that is more easily accessible, and to continue seeking for opportunities to improve and develop corporate social responsibility activities. 	Human Rights	⊙			pp. 42-47
			Quality, Safety, Health, and Environment (QSHE) Management	⊙			pp. 32-41
			Corporate Social Responsibility	⊙			pp. 96-111
			Sustainable Procurement	⊙	⊙		pp. 68-75

Operating Context	Risks, Opportunities, and Impacts	Stakeholder Viewpoints and Expectations	Related Material Sustainability Matters	Business Strategies Related to the Management of Material Sustainability Matters			Additional Information Regarding Management Approach
				Strengthen the Core	Value Chain Enhancement	Seed the Options	
Demographic changes	<ul style="list-style-type: none"> Global aging population trends, especially in Thailand, with one of the most rapidly aging populations in the world, and associated potential impacts on businesses are unable to manage retirement, especially for businesses such as Thairoil that are seeking to expand The new generation's (Millennials and Gen Z) behavior and expectations of the workplace, and the differences of such behavior and expectations from existing workplace practices, which may lead to challenges in recruitment and eventual labour shortage without adaptation to attract this demographic, especially in the context of business expansion 	<ul style="list-style-type: none"> Shareholders/creditors/ financial institutions, customers, suppliers/contractors, and communities expect that Thairoil employees will have the capacity to adequately respond to stakeholders' expectations. Employees expect that Thairoil will be able to attract and recruit enough employees to meet business expansion needs and upcoming retirement, as well as take the necessary actions to improve employee retention. 	 Human and Organization Development	⊙	⊙	⊙	pp. 86-95
Digitalization	<ul style="list-style-type: none"> Risks in transitioning to the digital age in the oil refinery industry, especially in the preparation and organization of workers' potential to respond to digital transformation, which may affect ability to compete Opportunities to increase operational efficiency through the use of technology Opportunities to invest in new technologies that create long term revenue growth 	<ul style="list-style-type: none"> Shareholders/creditors/financial institutions expect Thairoil to report our approach in adapting our business and using innovation to confront the challenges in the next 10-15 years, especially the risks from changes in the oil and gas industry. Customers expect Thairoil to maintain product quality, especially in the context of business expansion with the CFP Project, and use innovation to meet customer demands and secure customer satisfaction. Employees expect Thairoil to be an agile organization that is able to improve operations to respond to customer and consumer needs in a timely manner, adapt to the changing business context in a timely manner, and improve human resource management. 	 Human and Organization Development	⊙	⊙	⊙	pp. 86-95

Operating Context	Risks, Opportunities, and Impacts	Stakeholder Viewpoints and Expectations	Related Material Sustainability Matters	Business Strategies Related to the Management of Material Sustainability Matters			Additional Information Regarding Management Approach
				Strengthen the Core	Value Chain Enhancement	Seed the Options	
<p>Digitalization (Continued)</p>		<ul style="list-style-type: none"> Suppliers/contractors see innovation as an important means to improve the work process of Thaioil. The government and related public agencies expect Thaioil to maintain the quality of oil refining processes. 	 <p>Innovation and Customer Stewardship</p>	⊙	⊙	⊙	pp. 78-85
<p>ESG Reporting</p>	<ul style="list-style-type: none"> Increased awareness of responsible investment, including environmental, social and good governance aspects, amongst investors of various institutions in both the global and national levels, such as the development of the Thailand Sustainability Investment (THSI) and the Negative List Guideline of the Government Pension Fund, which may create impacts on business in terms of reputation and revenue that can be lost if management of such issues is inadequate 	<ul style="list-style-type: none"> PTT, the majority shareholder, expects that Thaioil will operate according to strategies relating to PTT Group's environmental strategy. Suppliers/contractors expect Thaioil to take the lead in helping partners build capacity with regards to management of environmental, social and governance matters. The government and related public agencies expect Thaioil to continue to improve upon measures to fight against corruption. 	 <p>Fight Against Corruption</p>	⊙			pp. 52-57

Strategy Outlook

Based on the material matters identified from the previous table, Thaioil Group has formulated business strategies, and short and long-term investment strategies during the period 2018-2030. The Strategic Direction 2030 will help to strengthen our organization and creates shared value for our stakeholders. The strategy consists of three main strategic directions: Strengthen the Core, Value Chain Enhancement, and Seed the Options; which Thaioil will regularly monitor and review the strategy on an annual basis to ensure that we are progressing towards our business and sustainability target.

VISION

“Empower human life through sustainable energy and chemicals”

2019 (Short-term plan)

2023 (Medium-term plan)

2030 (Long-term plan)

Strategic Direction



Strengthen the Core

Strengthen core businesses in oil refinery and power generation, by focusing on the cost competitiveness and profit generating capacity, to secure a sustainable income stream for Thaioil Group.

- Develop a high efficiency refinery and refining capacity. In 2019, Thaioil achieved refining capacity 107% of nameplate capacity, which translated into 362,179 million THB in sales revenues.
- Invest in the Clean Fuel Project.
- Establish the CFP Support Center as a center to manage activities related to the Clean fuel Project, including community complaints.
- Reduce direct and indirect greenhouse gas emissions from the production process through increasing energy efficiency. In 2019, Thaioil reduced GHG emissions by 84,265 tons carbon dioxide equivalent.

- Reduce greenhouse gas emissions by 4% from business-as-usual (BAU) by 2022.
- Accomplish the zero waste to landfill target by 2020.

- Enhance the quality of life of communities and society through the Sustainable Energy for Health Care framework.
- Apply circular economy principles to operations, especially in the production processes.
- Reduce greenhouse gas emissions by 6% from business-as-usual (BAU).



Value Chain Enhancement

Extend the value chain to downstream businesses, such as the olefins and aromatics business, chemical distribution business, specialty products business, and marine transport business, in order to enhance product value and business diversity, as well as expanding business growth to neighboring countries.

- Expand the petrochemicals business to other countries in ASEAN, including Myanmar, Indonesia, and northern Vietnam. In 2019, revenues from this product group amounted to 9,102 million THB.

- Conduct feasibility studies on petrochemical market expansion.

- Conduct feasibility studies on petrochemical market expansion.



Seed the Options

Seek new business alternatives through investing in research to create green businesses, and increase the share of new businesses through investing in startups and venture capitals, both in Thailand and overseas, to capitalize on innovation in the research and development in various fields.

- Invest in corporate venture capital (CVC) projects to develop technologies in various fields, including technologies to advance capabilities in production and management, technologies that preserve the environment and improve the quality of life, and technologies that impact the long-term use of petroleum. At present, Thaioil has invested in 1 CVC fund in the United States.

- Conduct feasibility studies on investments in the renewable and electric value chain business, bio-based business, and circular economy business.
- Advance upon CVC investments.

- Innovate new technologies to develop products that are environmentally-friendly, and consider investments in green businesses.
- Increase the share of green revenues in portfolio to no less than 25% of total revenues.

Corporate Governance and Sustainability

Thaioil Group’s material matters are governed by the Board of Directors and subcommittees in order to accomplish business strategy and targets. Details are provided as follows:

As of December 2019, there are 15 members in Thaioil’s Board of Directors:

1 Executive director



14 Non-executive directors

8 Dependent directors



6 Independent directors



Board Structure

Section 5 of the Corporate Governance Guidelines of Thai Oil Public Company (Limited) states that the Board must have at least five and up to 15 directors, and at least half must be permanent residents of Thailand. Directors may be or not be Company’s Shareholders. Directors are appointed to the Board either through being elected by shareholders during the Annual General Shareholders’ Meeting, or through appointment by the Board in the event that a vacancy has resulted from termination that is not based on service years. Directors must all have qualifications that meet regulatory requirements, and should not possess any characteristics prohibited by the Public Limited Company Act, B.E. 2535 (1992). As stated in Section 6, Chapter 68 of the Public Limited Company Act, B.E. 2535 (1992), they must be sui juris (full age); not be bankrupt, incompetent, or quasi-incompetent; not have been sentenced by a final judgement to imprisonment for dishonesty; and not have been dismissed from a government service or state organization or agency for dishonesty on duty. Furthermore, the Board must have at least one-third of its members be independent directors, and must have at least three independent directors at all times

In order to ensure that directors can adequately dedicate their time to fulfill their roles and deliver the best interest for Thaioil, all members of the Board must have no more than three directorships in companies listed in the Stock Exchange of Thailand. This number includes the directorship for Thaioil. Additionally, the Company has established guidelines for directors and executives, their partners in marriage and/or cohabitation, and children who are not of age, specifically that if they desire to sell Company securities, they should report to the Company Secretary at least one day in advance, and should report change in information related to holding securities to the Securities Exchange Commission within three days of the date of purchase, sale, or transfer. This is to control use of insider information that has not been disclosed to the public, and to promote fairness for other shareholders, in alignment with good corporate governance principles.

In 2019, Thaioil employed an independent/ external consultant to conduct an independent assessment of the performance of the Board, committees, and individual directors. The hired consultant helped to support Thaioil in identifying the assessment approach and recommending issues of concern from the assessment. Thaioil’s independent assessment of board performance will be conducted every three years, and results are to be publicly disclosed in the Company’s annual reports (Form 56-2).

Thaioil has developed a board skill matrix that follows with the policy for Board's diversity in skills, professions, and specializations, namely :



The board skill matrix is used in the Board nomination process to ensure that appointed directors have the required qualifications – including personal qualifications such as educational background, knowledge, expertise, skills, experiences, and specialized experiences that are beneficial or relevant for the Company's business - that will create a Board that has the qualifications that is fitting for the size, type, and characteristics of the Company's business activities. Candidates' gender, race, ethnicity, nationality, or place of birth do not affect the appointment process.

In 2019, Thaioil added information and digital technology and innovation to the board skill matrix. This is to ensure that the matrix remains relevant to the Company's business, strategy, and global trends. The updated matrix is also more aligning with the Company's strategic directions - Value Chain Enhancement and Seed the Options. Furthermore, the Board must maintain independence in accordance with the Company's guidelines, and adequately allocate time to fulfill roles and responsibilities. To ensure continuous development of directors' ability to perform tasks effectively, the Board must follow with the Company's policy to promote development and training for directors, such as training courses provided by the Institute of Thai Directors (IOD), or other courses and/or conferences that are related to the Company's business that are beneficial to governing according to the Company's strategy.

Roles and Responsibilities

Thaioil's Board of Directors and executives prioritize good corporate governance, with a vision to empower human life through sustainable energy and chemicals. The Board has appointed four committees to oversee specific responsibilities as assigned, and are to regularly report performance and progress to the Board. These include Audit Committee, Nomination and Remuneration Committee, Corporate Governance Committee, and Risk Management Committee. All committees are required to have the qualifications as required by laws and regulations. Thaioil has identified the qualifications, term of office, roles and responsibilities, reporting, and assessment in the charter of each committee. Currently, the four committees have roles and responsibilities as follows:



Audit Committee

The Audit Committee reviews the efficiency and effectiveness of good corporate governance, risk management, and internal control processes; reviews the Company's financial reporting process to ensure accuracy, credibility, and sufficient information and in compliance with Thai Financial Reporting Standards; reviews the connected transactions or transactions that may lead to conflict of interest and information disclosure as required by law, rules, and regulations of the Stock Exchange of Thailand; considers to select, nominate, re-elect, and terminate the Company's external auditors and to propose the auditors fee; reviews and provides opinions on internal audit plan and system to meet internationally accepted standard; considers the independence of the Corporate Internal Audit Department including the adequacy of the budget and workforce of this Department; and approves the appointment, rotation, and evaluates the annual performance of Vice President- Corporate Internal Audit Department.



Nomination and Remuneration Committee

Nomination Role - The Committee considers the Board's composition and qualifications of individual Director for the Board focusing on education, knowledge, expertise, skills, experience, and specialization that associates with the Company's business as well as their independency in accordance with the Company's criteria; selects qualified Directors to take position in the Board-Committees and table their names to the Board for consideration and approval in case of vacancy; considers the qualifications of the CEO/President to suit the Company's business management in order to achieve its objectives, covering education, experience, knowledge and expertise, as well as taking essential business trends into consideration; develops and reviews the succession plan of CEO/President as continuous preparation plan for readiness and successor to ensure business continuity of management and operations.

Remuneration Role - The Committee reviews and proposes remuneration form and criteria to suit the responsibilities of the Board by taking the Company's overall performance into consideration to motivate and retain Directors with competency, quality, and potentiality prior to table them to the annual general meeting for shareholders' approval; and conducts the performance evaluation and considers an appropriate remuneration for the CEO/President before proposing to the Board for approval.



Risk Management Committee

The Risk Management Committee defines and reviews risk management framework, the Risk Management Charter, risk management policies and process; as well as suitably and effectively suggests guidelines to risk management relating to the Company's business to correspond with business strategies, business plans, and volatile circumstances; continuously promotes and develops risk management and tools in all levels across the organization; to encourage risk management culture in organization; supervises, monitors, and reviews key risk management plans and report to ensure effective risk management at an acceptable level and corresponding with risk management policy.



The Corporate Governance Committee defines corporate governance policies, practices, and related operations including sustainability management and corporate social responsibility aspects to conform to principles, standards, and requirements stipulated by the Stock Exchange of Thailand, the Securities and Exchange Commission, and other recognized institutions domestically and internationally; supervises and monitors the Company’s operations to ensure compliance with established policies and practices, in order for continuous CG development; promotes CG culture; provides advice in the participation of CG-related assessment and rating; and considers the Board’s performance evaluation form and approves the overall evaluation before proposing to the Board.



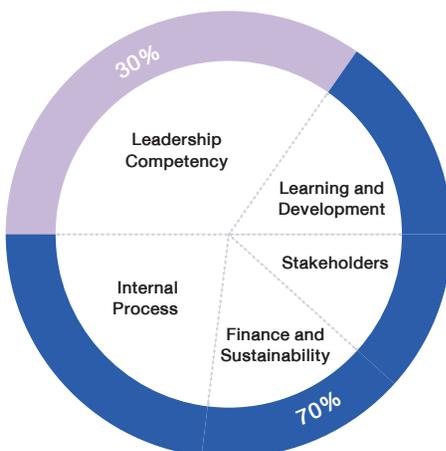
For the name list and other details on the Board of Directors, please see further in the 2019 Annual Report, or <https://investor-th.thaioilgroup.com/ar.html>

Corporate Governance and Code of Conduct Manual

Thaioil has developed a Corporate Governance and Code of Conduct Manual to guide our Board of Directors, executives, and employees in applying our principles in their daily responsibilities. The Manual is centered on our belief in equitable treatment of all stakeholders and respect of all stakeholders’ rights, and encourages our people to perform all their duties and responsibilities with honesty, dedication, perseverance, responsibility, and a desire to contribute to goodness in society. It assigns responsibility to our Board of Directors and executives to lead employees in applying Thaioil values in integrity, fairness, transparency, and accountability in all that we do.

Performance Indicators for Sustainability

In 2019, Thaioil established sustainability performance indicators that are tied to the compensation of the President and CEO and the Sustainability Development Committee. Additionally, Thaioil has corporate key performance indicators that are related to sustainability, and are cascaded to all relevant employees. Incorporating sustainability into performance measurement drives us towards achieving our targets in managing environmental, social, and governance issues. Indicators to a sustainability performance assessment are measured through the four dimensions of the Balanced Scorecard and the leadership competency criteria as follows:



Part 1 Corporate Key Performance Indicator Achievements (70%)

make up 70% of the performance metric. The corporate KPIs are defined according to a balanced scorecard that includes four main areas - finance and sustainability (20%), stakeholders (15%), internal process (45%), and learning and development (20%).

Part2 Leadership Competency (30%)

makes up 30% of the performance metric, and assesses the leadership competency of the President and CEO in six areas, including fostering a group vision, management that follows strategic plans, risk management, team management to achieve highest productivity, teaching and development, and personal excellence.

Sustainable Development Structure

The management of each material matter is responded by a specific function driven by subjective sub-committee. Sustainable development function will coordinate between sub-committees and regularly reporting progress to the Sustainable Development Committee and the Corporate Governance Committee. Progress is reported to the Board of Directors annually. However, if there should be a pressing material issue that requires immediate attention, the Corporate Governance Committee will report to the Board of Directors immediately.

Sustainable Development Committee

consists of the Chief Executive Officer and all Executive Vice Presidents, and is tasked with the following responsibilities:

1. Strategize and develop policies, targets, and key performance indicators that will lead to long-term sustainable development
2. Drive integration of sustainability strategy into the business strategy with short-term and long-term plans
3. Review and validate completeness of material sustainability matters of the company
4. Support relevant functions in the identification and assessment of risks related to the environment, society, and governance (ESG), as well as the development of action plans
5. Provide consultation and support of appropriate resources and human resources, and to consider the material matters
6. Promote employee awareness and organizational culture that embodies sustainability

Risk Management Steering Committee

1. Establish risk management frameworks, policies, structure, and strategy, including internal controls and business continuity management, to respond to changing contexts
2. Drive analysis and assessment of the risk levels, and the development of risk mitigation measures
3. Review, monitor, and oversee risk management performance, and regularly reports results and progress to the Risk Management Committee (RMC)
4. Provide feedback on plans, processes, and guidelines, and allocate necessary resources

Research and Development Steering Committee

1. Determine the direction of the research and master plan, with relevant targets and key performance indicators, to guide and support the strategic plan
2. Support commercialization of research and development results
3. Monitor progress and evaluate success
4. Provide research budget, manpower, equipment, facilities, and promote collaborations with other research institutes

Energy Management and Loss Improvement-Working Team

1. Implement tasks related to energy management and loss improvement to follow with Thaioil's energy conservation policy and targets
2. Collect past data, monitor present energy performance, and evaluate performance in comparison to the target to ensure that energy management and loss improvement is conducted effectively
3. Organize training sessions and activities that promote awareness and understanding of energy conservation and loss improvement
4. Report and present results to lead the revision and improvement of policies and processes.

Energy Management and Loss Improvement-Internal Energy Audit Team

1. Coordinate with the Energy Management & Loss Improvement Working Team to operate in compliance with regulatory requirements
2. Audit supporting documents, evidence, and performance results of the Energy Management & Loss Improvement Working Team in accordance with regulatory requirements
3. Develop conclusive reports on the internal audit and submit it to the Energy Management & Loss Improvement Working Team

Waste Management Taskforce

1. Determine waste management approach and develop waste management plans
2. Drive appropriate waste management systems and tools
3. Monitor and reports progress such that they are in line with corporate targets
4. Review processes and shares lessons learned

Environmental and Community Relations Committee

1. Provide the direction on managing environmental impacts, community relations, and other impacts from Thaioil, such that the Code of Conduct principles on corporate social responsibility are satisfied and stakeholders' expectations and needs are adequately responded to
2. Manage Thaioil's activities and initiatives related to the environment and community relations such that they are in line with international standards, and communicate these initiatives
3. Analyze and review the effectiveness of activities and initiatives related to the environment and community relations, provide recommendations for improvements, and report performance in line with Thaioil's principles on corporate social responsibility or international standards

Ethical Cultivation and Communication Working Team

1. Plan and strategize communications and ethical cultivation in the organization
2. Coordinate with relevant functions, both internal and external, to ensure the implementation of activities to proceed as planned
3. Share and communicate information on ethical cultivation to different functions within Thaioil Group to ensure awareness, understanding and participation in activities
4. Implement tasks and activities as agreed in committee meetings

Human Rights Working Team

1. Manage and support the implementation of the Human Rights Policy, and promote the integration of human rights principles with company culture
2. Review the accuracy and relevance of assessment results and the Company's interpretation of human rights
3. Monitor performance and progress, assess likelihood of human rights impacts, as well as potential of human rights risks relevant to the organization and regulatory context, and develop mitigation measures
4. Report results of improvement actions taken, conflicts, issues, or risks related to human rights to executives of corporate human resource management

Safety, Occupational Health and Work Environment Committee

1. Review policies and action plans related to occupational health and safety
2. Report and provide recommendations to improve performance and maintain compliance with occupational health and safety regulations and standards in order to ensure the safety of all employees, subcontractors, and any other individual visiting onsite
3. Promote and support the organization of occupational health and safety-related activities, and monitors, reports, and evaluate performance
4. Conduct audits of occupational health and safety at operation areas and inspect statistics related to incidents in the area of operations at least once every month

Thaioil Group Corporate Governance System and Process Development and Design Taskforce

1. Study and evaluate the best practices in system designs and processes of good corporate governance to obtain the highest efficiency and to ensure standardization across Thaioil Group
2. Design corporate governance systems and processes that cover legal monitoring, identification of legal characteristics and important information, monitoring and inspection, as well as reporting and ensuring clear allocation of roles and responsibilities
3. Design commercial needs to develop corporate governance systems, including compliance reporting and dashboard
4. In the event that there is a new law or major change, the Taskforce Lead may appoint a sub-working group as needed to ensure understanding of the new law or changes and all related details
5. Develop action plans for the Taskforce, coordinate, direct, and communicate to relevant individuals to ensure completion of the action plan.

Value Protection

Value protection in a context of constantly changing internal and external factors is a challenge for petroleum and petrochemical businesses. Thailo and Subsidiaries therefore strive for operational excellence through maintaining a robust risk and crisis management system that covers Quality, Safety, Health and Environment (QSHE) risks, as well as risks from external factors such as the impacts of climate change on business and the risks of violating human rights of stakeholders in business activities. And, most importantly, we have established a foundation within the organization for the business' operating principles, laws and regulations, and codes of conduct in order to support our business strategy to Strengthen the Core business, and to achieve Value Chain Enhancement for the petrochemical, and chemical products businesses. This section of the report consists of material matters related to our management of risks that may compromise Thailo's ability to create value in the long term.



Fight Against Corruption



QSHE Management



Human Rights



Climate Change Risk



Important Strategies



Manufactured Capital

Maintaining manufactured capital in order to avoid business disruption and creating the utmost efficiency in order to deliver products to the market continuously.

Process Safety Event
0.09
events per million work hours



Human Capital

Maintaining human capital in order to prevent injury and loss of life, as well as ensuring respect for the fundamental rights of all stakeholder groups.

Work-related injuries
0.37
cases/million work hours for all workers, which is better than the target



Financial Capital

Maintaining rules and regulations, and strictly comply it to maintain the labor permit and the opportunity for business expansion.

0
incidents and penalty fees from noncompliance with laws and regulations, as well as cases of corruptions and bribery



Natural Capital

Maintaining the equilibrium of the ecosystem in order to reduce environmental impacts from business activities.

7.32%
GHG emission reductions, compared with business-as-usual (BAU)



Social and Relationship Capital

Maintaining acceptance from the government and society in order to continue conducting our business alongside them.

100%

All expansion projects conducted public participation in compliance with laws.

Quality, Safety, Health, and Environment (QSHE) Management

Challenges, Risks, and Impacts

Thaioil has commenced various capital projects, to support our business expansion plan, such as the Clean Fuel Project (CFP); the Jetty 7 and 8 Expansion Project; the construction of new office building, the laboratory building, the engineering and warehouse building; and the crude oil tank construction project. This requires numerous important activities to be prepared and implemented, such as the implementation of Operational Excellence Management System, the demolition work of existing equipment to prepare for the upcoming expansion projects while still running current operation units etc. To achieve these, Thaioil needs to review and improve safety control measures in order to ensure that normal operations can continue sustainably without any critical incidents or leakage of flammable or chemical substances, or loss of primary containment that may cause severe impacts, resulting in an unplanned shutdown or impacts on the business continuity.

There are also other challenging factors e.g. changes in environment, changes in the more stringent requirements and the standards of occupational health and safety practices, and other external factors. All of which can pose significant challenges to Thaioil and may prevent us from achieving our goal of being “an organization that is free from accidents (No Harm No Leak Goal Zero) to employees, contractors, and related stakeholders,” as well as prevent us from meeting the societal expectations regarding environmental impacts to health & well-being of the surrounding communities.

Furthermore, to enhance the quality of life of our employees, community members, and other stakeholders by Thaioil's new mission - “empower human life through sustainable energy and chemicals” - and mission - “to enrich stakeholders' well-being and deliver sustainable returns built upon innovation, technology and resilient portfolio with top class management and accountable corporate governance”. With higher stakeholder's expectations, stringent regulations, and global sustainability management trends have all posed significant challenges for Thaioil's management of quality, safety, health, and environment, and corporate social responsibility in all business activities and future business expansion throughout the value chain.

Commitment

Thaioil Group is committed to operate business with carefully managing quality, safety, health, and the environment to ensure that all operations comply with regulations, laws, and measures to prevent environmental impacts. To achieve this, Thaioil focuses on strengthening our management system that covers occupational health and safety management, emergency and crisis management, quality management, environment and complaint management, and the compliance assessment. This management system is enforced by policies in relations to quality, safety, health, environment, energy management, and corporate social responsibility, which all guide Thaioil towards preventing, managing, and mitigating any impacts that may occur from normal operating conditions, abnormal operating conditions, and emergency operating conditions in both the present context and future business expansion.

Furthermore, Thaioil remains committed to protecting our business partners from regulatory risks, especially in relation to environmental regulations, that may result in business disruption, as indicated in the Thaioil Group Supplier Code of Conduct (read more in the “Sustainable Procurement” chapter).

Targets

- Maintain safety maturity level to level 4 by 2022
- Maintain safety performance (total recordable work-related injury rate: TRIR) that is comparable to the top 10% performers in the oil and gas industry by 2022

Occupational Health and Safety

Occupational Health and Safety Management System

Thaioil has adopted the international 'Enhanced Safety Management System' standard to manage our safety performance since 1961, which integrating with the BS OHSAS 18011 system and the Operational Excellence Management System (OEMS) that focuses on using the "PDCA cycle" in every work process. There are in place the safety policy, the safety manual, and the safety procedures covering all activities with potential risks to employees and contractors, and covering all areas of operations under Thaioil Group's controls. In 2019, we have formulated our new strategy, called the 'House of Business Excellence,' intending to pave our way towards becoming a world-class refinery within the next four years. Safety is certainly one of the core pillars of this strategy to be implemented and improved. Moreover, with our aspiration to enhance our safety performance towards the world-class standard, we have set the new "No Harm No Leak Goal Zero" targets, and have reviewed the Five-Year Occupational Health & Safety and Emergency & Crisis Management Plan to reflect the internal and external changing contexts, risks, and new corporate strategy and targets.

Hazard identification in the workplace, risk assessment, and investigation of incidents with risks

Thaioil Group has developed a methodology to identify hazards, risks, and opportunities for improvement by using What If, Bow Tie, and HAZOP strategies that cover activities performed by employees, contractors, and external factors that could affect the Company. Thaioil has also prepared occupational health and safety plans to reduce and maintain risks within the acceptable levels at all times. There is also a plan to monitor and review risks every six months, and find opportunities to improve at least once a year or when there are changes.

For tasks that do not occur regularly, there are hazard identification and risk assessment procedures, such as 3 What and JSA, that cover work activities and work areas, and procedures to assign control and prevention measures that are aligned with identified risks. The Electronic Permit, or the SAP Permit, requires communication through Toolbox meeting before starting work, and safety checks consistent

with requirements specified in the work permit. There is also a systematic analysis of results and recommendations for further improvements.

Additionally, Thaioil encourages submission of Potential Incident Reports (PIR) that focus on Unsafe Acts and Unsafe Conditions as a preventive safety measure. Alongside efforts to promote PIR submission, Thaioil has initiated a campaign to encourage workers to speak up when unsafe acts are being found. Those who observe an unsafe act should stop that action or activity, and suggest corrective action in accordance with Thaioil's safety procedures. The individual who was performing the unsafe act should thank the individual who gave the reminder, and follow recommendations such that Thaioil safety guidelines are followed. This initiative demonstrates our efforts in developing and advancing safety leadership in the workplace to ultimately cultivate a safety culture in Thaioil Group.

In the event that workers (employees and contractors) notice or experience working conditions that pose risks to their health and/or life, they can stop the work and report to the supervisor and the officer in charge of the operation area. The supervisor needs to investigate and determine a solution to ensure safe working conditions for the worker to proceed and continue with the operation. As this is a part of the campaign for workers to report on unsafe working conditions through PIR reporting, workers will not be disciplined for the stop-work incident. On the contrary, workers who use their stop work authority will be commended through the PIR of the Month project.

Thaioil pays significant attention to and implements projects to develop a safety mindset and enhance safety maturity level. We have adjusted our functional strategy from Safe White Green to All SAFE White Green in order to develop and elevate safety mindset and leadership in the workplace for all employees and contractors. This strategy is executed through the organization of QSHE Roll Out activities in various areas of operations, especially during the annual turnaround and in areas of operations undergoing construction. In addition to raising awareness and strengthening safety culture of workers in operations, these activities also enhance worker participation of workers in real working conditions.

Work-related incident investigation procedure

The reporting and investigation of accidents are the heart of the safety management system. The objective is to find the true root cause and define preventative measures to avoid recurrence. Thailoil requires accident cases, abnormal event cases, near-miss cases, and potential incidents to be reported and recorded systematically as Opportunity for Improvement (OFI). When such cases or incidents occur, people in the event or witnesses must write a report to the supervisor of the area and others involved within 24 hours. After that, there will be an appointment of a group to investigate to find the root cause in order to systematically set measures to prevent such events from reoccurrence. Therefore, the TRIPOD incident investigation was introduced as a guideline in conducting investigations. Periodic follow-up investigations are done to monitor implementation of corrective actions and improvement measures. Finally, to ensure that preventative measures are most efficient and effective, a summary of the lessons learnt from the accident or abnormal incident (lesson learned sharing) is communicated to employees and contractors through various communication channels of Thailoil.

Occupational Health Services

Maintaining and protecting the health of employees and contractors are the ultimate goal in the operations of Thailoil and Subsidiaries, especially when operating in the refinery area, where could expose to harm to the worker's health at anytime, If safety control measures are defective, or workers are not following the rules or procedures. The Health Risk Assessment is one of the guidelines that is used internally to identify hazards and determine the impacts to worker's health in order to define appropriate safety measures and reduce risks.

Monitoring the work environment and comparing results against the standard value are one of the measures that the company has adopted to evaluate safety measures that may affect a worker's health in normal operations, project work, or maintenance work. In the case that the results are higher than the standard value, Thailoil will implement a plan to improve and monitor systematically.

Furthermore, Thailoil has arranged a specific function, occupational health experts, and specialists in occupational health medicine to provide consultation and guidance on issues related to occupational health to employees and contractors at any time.

Participation, consultation, and communication with workers on occupational health and safety

Thailoil has appointed a safety, occupational health, and work environment committee consisting of representatives from employees involved in operations that make up at least 50% of the committee (excluding the Chairman) which will meet at least once a month for news update, and progress monitoring of future operations plans.

In 2019, Thailoil has adjusted a strategic plan to focus on House of Business Excellence that will drive our status to a world-class refinery in the next four years. As safety is one of the core pillars to be developed and upgraded to achieve a world class safety standard. Thailoil has revisited corporate safety targets in line with the new strategy, which is "No Harm No Leak Goal Zero", and have reviewed the Five-Year "Occupational Health and Safety and Emergency and Crisis Management" Plan to reflect the internal and external contexts, risks, and new corporate strategy and targets. In addition, the Company has reviewed the Permit to Work System, especially with regards to work permits for work with ignition sources near flammable materials, or "hot work", in line with international best practice. These adjustments and improvement shall be communicated to relevant staff for effective and efficient implementation. There is a systematic performance analysis and learning from serious safety incidents. Additionally, there are consistent checks and identification of indicators to monitor compliance of recommended practices, including continuous reviewing of safety in operations by executive management.

Occupational health and safety training

Thaioil sets the criteria in identifying training on occupational health and safety and fire prevention that is needed for employees and contractors. The criteria covers the position of the worker as well as the risk level (i.e. high-risk activities) and type of work. We have prepared a training plan, implementation plan, evaluation plan, and documentation in order to develop employees' knowledge, ability, and understanding of hazards and risks that may lead to accidents, as well as methods to protect themselves and contain hazards.

Promoting worker health

Thaioil provides services and supports workers in accessing medical services for non-work related incidents.

Scope

- Employees in TOP, TLB, SPP, TPX, and LABIX refineries, and employees at Bangkok office and operation units of pipeline distribution.
- Contractors in the refinery

Medical services

- Provide basic treatments and emergency treatments in the company medical unit by having a nurse available 24-hours every working day and doctor available on working days during 13.00- 16.00 hours
- Provide advice relating to health through the company's public relations channels and arrange for a question-and-answer session or a way to contact nurses available 24 hours a day
- Provide annual health check-up and vaccination against influenza for employees at work points such as process control rooms, office buildings, and engineering buildings.

Thaioil has voluntarily arranged initiatives to promote worker health, which can reduce non-work related health risks, including:

- The "Good Health by Company Doctors for Employees with Non-Communicable Diseases" Project;
- Weight Loss Project;
- Workplace and Resting Area Exercise Project;
- Biannual activities organized to promote health and raise "healthy awareness"; and
- Reminder services provided for employees to receive physical examination prescribed by the doctor; and
- Providing exercise equipment and facilities in places such as fitness rooms at the office building of Thai Lube Base Public Company Limited, Phubai Office Building, and Thaioil Club.

Prevention and reduction of occupational health and safety impacts from business partners

Thaioil included occupational health and safety questions as part of the annual supplier survey, which is a general survey of supplier needs and satisfaction conducted by a third party. We have also established corporate indicators regarding supplier safety performance, determined functions responsible for taking care of suppliers, evaluated and summarized survey results, provided recommendations and corrective actions for suppliers (if any), and systematically monitored implementation of corrective actions.

Most importantly, Thaioil Group's executives give importance to risk management and loss prevention in conducting business activities. There is an established policy that drives incident prevention, and provides the necessary resources to implement this policy through the Five-Year "Occupational

Health and Safety and Emergency and Crisis Management" Plan. In 2019, we adjusted the strategy to achieve House of Business Excellence in order to prepare to become a world-class oil refinery in the next four years. In realizing this goal, safety counts as one of the main pillars that Thaioil must develop and elevate. Thus, in order to move our safety performance towards world class standards, Thaioil has adjusted corporate safety targets to align with this new strategy. These safety targets are called the "No Harm No Leak Goal Zero". In addition, we have reviewed our Five-Year "Occupational Health and Safety and Emergency and Crisis Management" Plan to ensure that it is fitting with the internal and external contexts, risks, and new strategic plan and corporate targets.



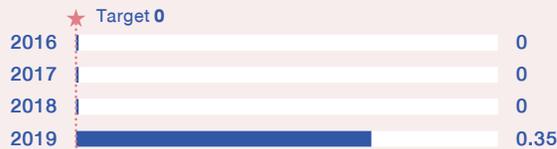
Safety maturity level in 2019
4.08
 (Resulting from performance in 2018)

Total recordable work-related injury rate of
0.7 case
 per million hours worked for employees

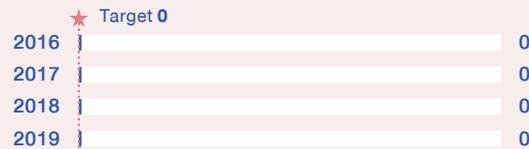
Total recordable work-related injury rate of
0.32 case
 per million hours worked for contractors

In 2019, Thaioil was able to manage occupational health and safety according to our plans for safety operations. The combined TRIR of contractors and employees was equal to 0.37 cases per million hours worked, which was better than our target of 0.50 or below case per million hours worked, with no accidents that would cause occupational illnesses or fatality. Our performance remains in the top 10% within the oil and gas industry.

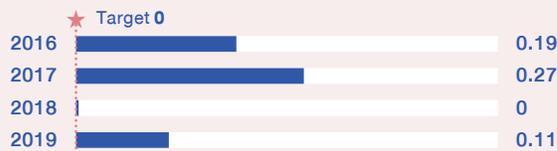
Lost-time injury frequency rate (LTIFR) for employees



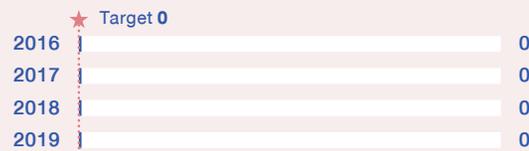
Occupational illness frequency rate (OIFR) for employees



Lost-time injury frequency rate (LTIFR) for contractors



Occupational illness frequency rate (OIFR) for contractors



Unit: Cases per million hours worked

Process Safety and Integrity

Mechanical Integrity and Process Safety Management System

The primary objective in operations is to maintain business continuity without critical incidents, loss of primary containment (LOPC), or abnormal incidents related to the production process that could lead to loss of life, assets, environment, and reputation of Thaioil Group. Thus, process safety management (PSM) is crucial to our success, and a key factor in driving and strengthening Thaioil Group's capability in accomplishing the No Harm No Leak Goal

Zero target in order to achieve excellence in our production process. To that end, Thaioil has established a Technical Safety team since 2018 to develop and elevate our process safety management towards international standards. We have integrated a process safety management system in our production process according to OSHA requirements, and have applied international best practices in our process safety management, as illustrated in Figure 1.

Thaioil prioritize proactive risk management to prevent critical incidents. This means we consider risks right from the start in designing new projects, construction, during operations, and all the way to improving the production process to increase safety. This integration has strengthened Thaioil Group's management system and safety culture in the production process, and has made us an organization with a safe production chain.

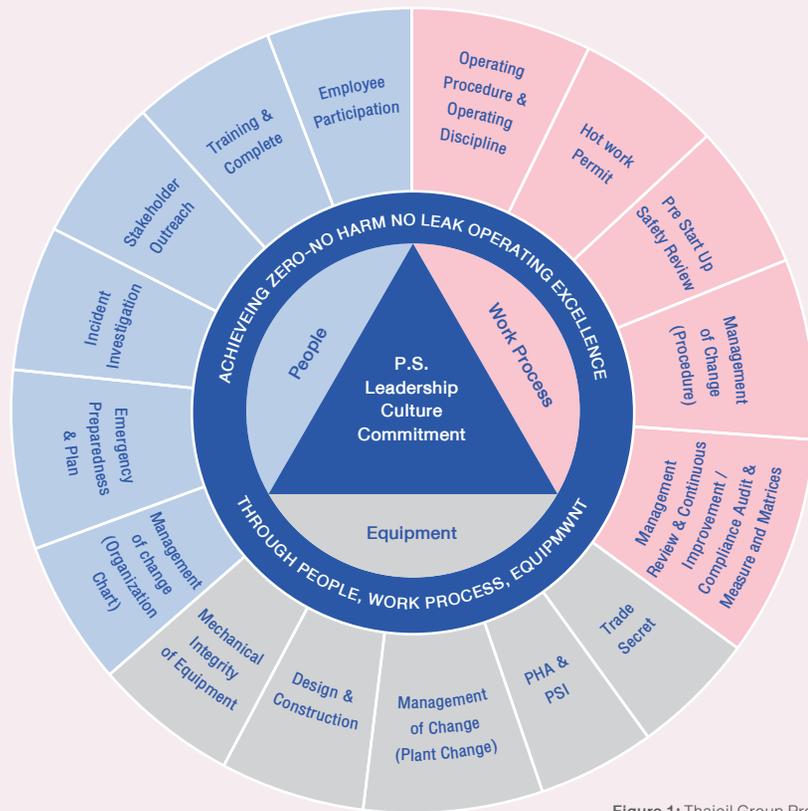
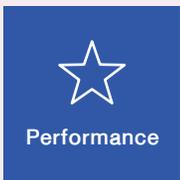


Figure 1: Thaioil Group Process Safety Management Model.



Performance

In 2019, Thaioil Group implemented the following safety initiatives:

Reviewed the Five-Year Process Safety Plan to develop and upgrade our process safety management system for more alignment with international best practices, and advanced process safety performance towards world class standards through the No Harm No Leak Goal Zero targets; and

Developed and enhanced critical safety procedures in the production process, including the hazard effect management process (HEMP) – where the bow tie risk analysis method is applied to analyze and identify severe hazards and hazard causes, and determine control and preventative measures – as well as process isolation, mechanical integrity, and the development of practice guidelines, checklists, and record-keeping related to the production process.

Risk management approach

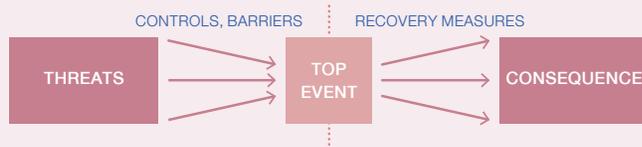


Figure 2: Risk Management Approach Diagram

Improved management measures related to incident investigation and reporting of accidents, incidents, and safety in the production process (incident management), including learning from occurred incidents;

Promoted a safety mindset in the production process with the 10 Process Safety Fundamental Rules, and led a campaign for employees and contractors to learn from incidents and best practices, where they can then reflect upon lessons learnt and apply knowledge gained to improve process safety and emergency management in Thaioil to ultimately prevent severe accidents and further develop our crisis and emergency management towards international standards;

Applied tools used in causal learning – a method for in-depth root cause analysis that covers multiple levels of cause-and-effect analysis until the real underlying root causes, including the actions or decisions that led to the accident or incident, are identified – to investigate serious accidents or accidents with high and complex consequences, identify the root cause, and establish effective preventative measures;

Inspected process safety with determined inspection plans, inspection checklists, reporting, monitoring corrective actions, and systematic performance evaluation;

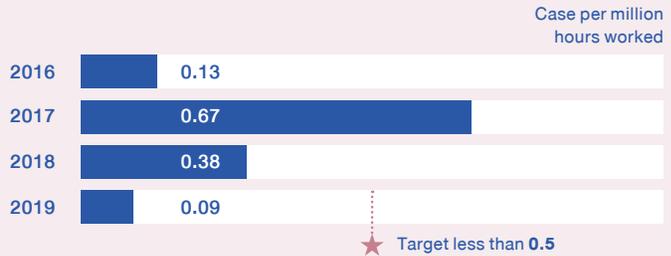
Determined process safety performance indicators (Leading and Lagging), such as indicators regarding Tier 1 and Tier 2 loss of primary containment (LOPC), following API RP 754 (American Petroleum Institute Recommended Practice 754) guidelines, and conduct weekly performance review by executives.



In 2019, there were two incidents of leakage of flammable or chemical substance, or loss of primary containment, that caused severe impacts as defined by the API 754 (LOPC Tier 1 and 2). This places our process safety incident rate at 0.09 case per million hours worked, which satisfies our 2019 target of 0.5 or below case per million hours worked. Thairoil has investigated the incidents to identify the cause of the incident and determine mitigation and preventative measures in the future. Based on the investigation, we found that the implemented detection system and authority in charge were able to detect and therefore contain the situation promptly, ensuring that there no consequences that led to process disruption.

Indicator

Process safety incident from leakage of flammable or chemical substances, or loss of primary containment, that caused severe impacts as defined by API 754 (LOPC Tier 1 and 2)



Environmental Management System

Thairoil Group is committed to developing our environmental management system to achieve business growth in tandem with caring for the surrounding environment and communities’ quality of life. This is reflected in the “Thairoil Group Quality, Security, Occupational Health and Safety, Environment, Energy Management, and Corporate Social Responsibility Policy”. Thairoil has also applied other environmental management guidelines – namely, ISO 14001:2015, the Global Reporting Initiative (GRI) Standards, improvement practices towards excellence as defined in DJSI assessment, Environment Cooperate Governance guidelines, and CSR Standards (ISO 26000) under the CSR-DIW Project – in continuously governing and developing our management system. This covers risk assessment, development of measures to control and mitigate environmental impacts, performance monitoring and inspection, reporting, and improvements through the entire supply chain from process to product.

In 2019, Thairoil Group focused our efforts in managing three aspects – environmental, social, and governance, or ESG, aspects – to drive the organization forward under the “Partner for Life” strategy, which ensures transparent business growth, equitable benefits for all stakeholders, while simultaneously and sustainably maintaining environmental stewardship and community satisfaction.

Through our participation in the Corporate Sustainability Assessment (CSA) of the Dow Jones Sustainability Indices (DJSI) – an important corporate key performance indicator of economic, social, and environmental management – Thairoil has identified improvement opportunities and accordingly developed a Five-Year Environmental Master Plan to drive sustainable management of environmental factors within Thairoil Group. This covers different operating conditions, including:

Normal Operating Conditions:

Thairoil and Subsidiaries have established measures to control environmental impacts of the production process at source. In addition to this, the existing and ongoing expansion projects – such as Clean Fuel Project (CFP), Terminal Expansion Projects 7 and 8, the construction of the Thai Oil Siracha Building (TSB) and other existing projects - in more than 1,547 rai have likewise required additional control measures, and this leads to the establishment of standards to guide efficient production; reduction of water pollution, waste generated, air pollution, and greenhouse gas emissions; and efficient resource use with circular economy initiatives and the 3Rs (Reduce, Reuse, Recycle) strategy. Thairoil has also made additional improvements and

developments to the environmental standard specification, in order to use it as a framework to guide our construction activities. The framework covers regulations, laws, best practices, and stakeholder views and is governed by criteria related to the environment. This is to ensure that Thaioil would respond to the regulations and expectations of all stakeholder groups.

Furthermore, we manage our business partners through the Supplier and Contractor Program, which stipulates environmental and social guidelines for suppliers and contractors that promote compliance with Thaioil Group requirements. Our procurement function has developed a framework and guidelines for business partners to ensure environmental management in the supply chain. In 2019, Thaioil Group has also collected and reported environmental costs, revenues, and investments (Environmental Management Accounting: EMA), and has continuously participated in the CSR-DIW program, to demonstrate clear environmental and social commitments. Additionally, we have the Energy and Loss Committee that is tasked with planning, controlling and monitoring production performance, to ultimately control and reduce energy consumption, which affects our performance regarding greenhouse gas emissions, pollution, and resource use efficiency.

Additionally, Thaioil Group has environmental quality monitoring procedures and assessment processes that comply with the ISO 14001:2015 standards for environmental management system frameworks. We take this responsibility very seriously and continuously look for improvement opportunities through seeking an external verifier – the Thai Industrial Standards Institute (TISI) – to conduct monitoring and assessment. Information related to our environmental management reported in our annual sustainability reports, including environmental management and performance highlights, is also audited and assured in accordance with the Global Reporting Initiative Standards. Furthermore, we have continuously developed our internal data collection and verification system to reduce errors in information sharing and increase convenience in data verification. Our Compliance Unit is tasked with driving compliance assessment and developing tools or systems to be applied in increasing work efficiency. As a result, Thaioil Group's environment management of the current production processes and various expansion projects have been complied with all related laws and regulations.

Abnormal Operating Conditions:

Thaioil Group has established the Environmental and Community Relation Committee (ECRC), where we can collaborate with public agencies, academic institutions, and communities surrounding the operational areas to think, act, correct, learn, and develop together. This may range from proactively planning initiatives to resolving issues as a team during abnormal operating conditions. Additionally, the team monitors conditions along 24 hours and 7 days. The ECRC also plans activities and communication platforms to track and monitor environmental performance for compliance with rules, regulations, and targets. This ensures that surrounding communities will receive minimum impacts. To that end, the ECRC convenes monthly to evaluate concerns and suggestions submitted by communities in order to improve performance, and conduct annual community perception surveys.

Environmental Emergency Conditions:

Thaioil Group manages significant aspects - namely, oil and chemical spills - through determining preventative measures to minimize environmental impacts, and establishing emergency and restoration plans. We also annually conduct oil spill and chemical spill cleanup exercises. This allows Thaioil to manage emergencies efficiently and minimize loss of assets and impacts to communities and the environment. Our management approach is efficient and consists of three main factors as follows:

1. Prevention of Environmental Impact

1.1 We are committed to only using ships that pass the safety standard assessment of the PTT Group Ship Vetting System. To that end, the captains of Thaioil Group and PTT Group assess the safety documents of every ship. Documents assessed include documents from the Ship Inspection Report Program (SIRE), information shared from international organizations, and information of ships serving PTT Group. We review information gathered and assess ship quality to ensure that Thaioil Group operates marine transportation of petroleum in accordance with international safety standards.

1.2 Regular maintenance of ports, buoys, and equipment used for oil transfer such as oil pipelines, safety joints, and ship ropes is conducted by Thaioil engineers.

1.3 Conduct random Tanker Safety Audits, where the port manager sends responsible persons to both domestic and foreign ships at Thailoil ports to conduct the audit. Any detected defects will be notified to the respective ship captain and manager for further correction actions to prevent the issues from repeating again.

1.4 Study of resource map and coastal land use in the Eastern Gulf of Thailand, where the study have been carried out to understand of the level of potential impacts on the resource's vulnerability against oil pollution around this sensitive area.

1.5 We have developed a database system and dashboard of spatial impact assessment results to manage the coastal environment. The system can forecast oil movement in the event of an oil spill, display the direction of water currents, and among other aspects.

1.6 Port Division employees shall regularly attend meetings and participate in activities with the IESG-Marine Safety to exchange knowledge on marine safety, and align their practices with international standards.

2. Mitigation

Thailoil's highest aspiration is to conduct our operations and maintenance of equipment, including equipment in the ocean such as oil pipelines, buoys, safety equipment, marine break away coupling (MBC) system, without causing oil or chemical spills. However, if an unforeseen incident occurs, Thailoil has the following management measures:

1. The emergency response plan outlines measures for oil or chemical spill containment and cleanup of all residue. The plan is regularly reviewed and updated according to the changing environment and newly developed technologies. We also organize annual oil spill and chemical spill exercises for operators on duty (TOP Group Duty), as outlined in the corporate emergency plan. The exercises ensure that all operators on duty understand their roles and can act in accordance with the emergency plan with accuracy, speed, and efficiency.

2. Ensure readiness of all oil removal equipment, both within Thailoil's equipment warehouse and on vessels, must be readily available at all times in cases of unforeseen incidents. We also regularly organize equipment maintenance, such as starting the engines and inspecting the spinning systems and hydraulic oil, on a monthly basis. The Occupational Health & Safety and Quality teams also conduct random audits to ensure that the equipment is always ready to use at all the time.

3. Personnel Development

Thailoil and Subsidiaries heavily prioritize on personnel development programs to ensure that our employees are ready to execute our oil spill and chemical spill response plans. In 2019, we delegated our employees to the following training sessions and seminars, located both in Thailand and overseas:

3.1 Chemical Spill Management Training: We invited experts from the CEDRE Institute in France to train different employees involved in the Company emergency plan to ensure that employees are aware of and understand action measures and have increased capability in responding to marine chemical spills.

3.2 Loading Master Course Training: The course was organized during the Quarter 4 of 2019 for Company employees and contractors in the oil loading department. It served to develop the knowledge and capabilities of new employees who will become loading masters, as well as review and update current employees' knowledge.

3.3 Marine Oil Pollution Prevention and Control Exercise: Thailoil partnered with the Center for Coordinating Efforts to Secure National Marine Interests in Area 1 (SR.CN 1) to organize this exercise on 13-14 February 2019. The exercise was participated by the First Naval Area Command, the Marine Department, Thailoil Public Company Limited, PTT Public Company Limited, and Esso (Thailand) Public Company Limited, with resulting good performance.

For 2020, Thailoil Group has the following activities planned as follows:

1. Conduct an Internal audit of marine oil and chemical spill management with engagement of relevant functions - such as the Occupational Health and Safety function, Environment function, Quality function, and Government Relations function - under the "Oil and Chemical Spill Health Check" Project to identify key findings to improve and strengthen the company's plans and activities, and coordinate with other relevant functions further;

2. Oil spill cleanup exercise organized with the Oil Industry Environmental Safety Group Association in Sriracha (IESG-SASC), which includes Thailoil Public Company Limited, PTT Public Company Limited, and Esso (Thailand) Public Company Limited. In 2020, Esso will be the appointed host, with the exercise simulating an incident wherein a marine oil spill happens in Esso, but spill containment will not successful

and Esso has to request additional support from Thailoil and PTT. The objective of this exercise is to test communication plans, coordination between companies, and the first line support promptness and ability to control the situation as fast as possible and prevent it from escalating. Additionally, we also practiced oil spill equipment mobilization to work areas and collaboration in marine oil spill cleanup; and

3. Plans to send employees to the Regional Industry Technical Advisory Group (RITAG) meeting in Vietnam to build employee capabilities in oil spill cleanup. The meeting will be held during October 2020. Member countries include Thailand, Malaysia, Singapore, Indonesia, Vietnam, China, South Korea, and Japan. The objective of this training is to strengthen the network in knowledge sharing on managing oil spill, build employee capabilities, and sharing of new technologies in oil spill cleanup. The Company will benefit from bringing this knowledge to improve upon the company's plan to be more robust and efficient.



Targets:

Zero case of significant oil and chemical spills

Zero non-compliance with laws and regulations

Compliance with environmental governance excellence of petroleum and petrochemical refineries



Performance



Social and Relationship Capital



No major non-compliance with ISO 14001:2015 standard since the introduction of the ISO 14001 standard in 2005



compliance with environmental laws and regulations confirmed through environmental quality monitoring



compliance with all related laws and regulations



compliance with environmental governance excellence of petroleum and petrochemical oil refineries
Remarks: TOP, TLB, TPX, LABIX



Natural capital



of significant oil and chemical spills since 2005

Remark:
Significant spills are defined as oil and chemical spills that leak more than 1 barrel into the ocean or more than 100 barrels on land.

Human Rights

Challenges, Risks and Impacts

Since the Universal Declaration on Human Rights established internationally agreed ideals on expected treatment of all individuals, the global community has been witnessing various developments in the area of human rights over the past 70 years. Mechanisms and tools, including those that allow proper assessment of human rights risks as well as those that promote monitoring to shed light on any violation that may occur, have been created and standardized to advance human rights. Nonetheless, despite unceasing efforts on the part of human rights advocates, we continue to see cases of serious human rights violations, such as the violations of the rights to privacy, family, food and shelter, equality before the law, and freedom of expression. To respond to this issue, both the private and the public sectors have had to step up their mode of operation to rise up to the challenge. It is also undeniable that the successful protection of human rights will not be realized without strong international partnerships and unwavering commitments from the UN member states, including, of course, Thailand as well. To that end, the Thai government has declared the 4th National Action Plans on Business and Human rights as a national agenda in 2017.

This underlying context places a demand on Thaipol and Subsidiaries to take responsibility with regards to our human rights performance. Furthermore, with our upcoming Clean Fuel Project (CFP), we are confronted with the challenge of managing a large-scale investment project that will rely on many workers to carry on labour intensive tasks and transportation of instrument and machine for construction for a period of approximately 4-5 years. Thus, our duty to protect and promote human rights increases in scope and severity.

Commitment

To ensure that CFP construction could be commissioned on time for further enhancing national energy security, Thaipol and Subsidiaries remain committed to promoting good human rights practices throughout our value chain. We continue to operate as mandated by our Human Rights Policy and Supplier Code of Conduct. All our human rights-related policies and procedures have been aligned with the UN Guiding Principles on Business and Human Rights, or the UNGP, which guide us towards the protection of the human rights of our employees, business partners (i.e. business partners, subcontractors, customers), and local communities, as well as the human rights related to resource use (i.e. soil, land, forest, forestry products, fishery resources, and unpolluted environments). We uphold our commitment to ensure that our treatment of all stakeholders throughout our value chain meet and go above and beyond of expected human rights standards, such that Thaipol may be looked to as a leading international practice on sustainability management.



See more information related to Thaipol Group's human rights policy on website.

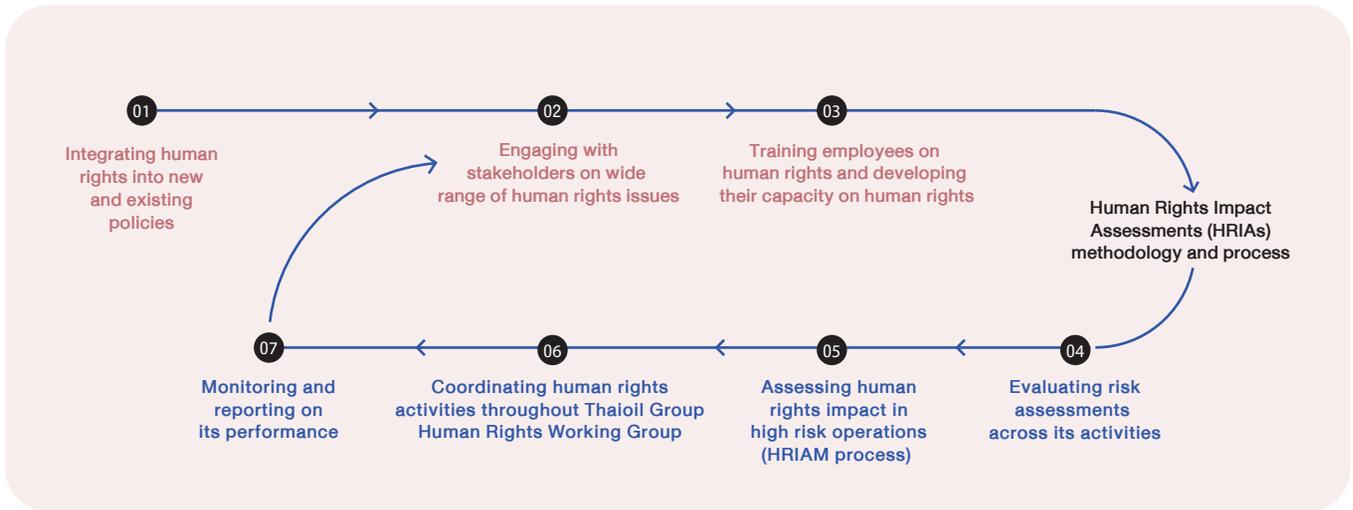
Management Approach

Thaipol's Human Rights Impact Assessment and Management

Thaipol and Subsidiaries have developed a process to assess human rights risks throughout our value chain based on human rights impact assessment and management guidelines of the International Finance Corporation (IFC), the UN Guiding Principles, and our internal risk management standards.

The Human Rights Impact Assessment and Management (HRIAM) counts as one of our 7 steps in conducting the human rights due diligence, namely:

Human Rights Due Diligence Process



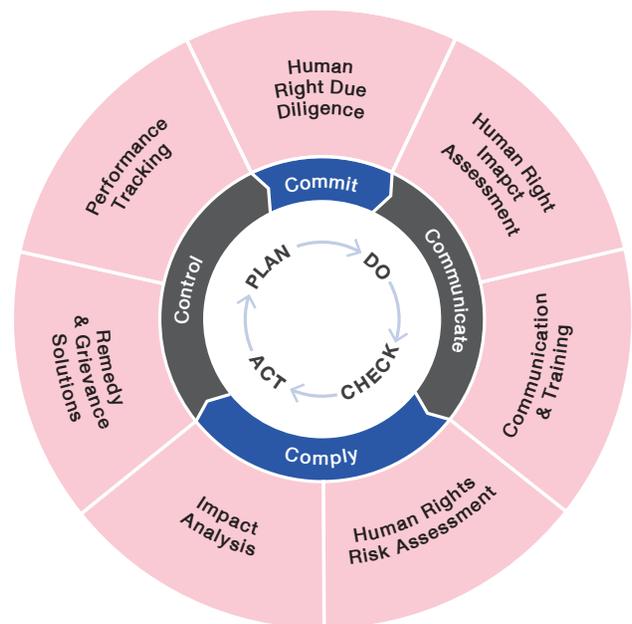
Human Rights Risk Assessment

In 2019, Thairoil conducted human rights risks assessment, which covered 100% of all business activities in our value chain, including both the activities that are part of our core business, as well as the activities related to our other businesses, and joint ventures; including, Thai Oil Public Company Limited, Thairoil Energy Service Company Limited, Thai Paraxylene Company Limited, Thai Lube Base Public Company Limited, Thairoil Solvent Company Limited, TOP Solvent Company Limited, Thairoil Power Company Limited, TOP SPP Company Limited, LABIX Company Limited and Thairoil Treasury Center Company Limited. The assessment was conducted by applying our enterprise risk management framework to assess and determine the level of human rights risks. We also refer to the human rights risk assessment criteria on likelihood and severity. These salient human right issues have been reviewed comprehensively in terms of impacts towards both internal and external stakeholders, such as our employees, business partners, customers, and communities, including women, children, migrant workers, disabled people, elderly, patients and transgender with a view to assessing and considering the materiality of these salient issues.

Furthermore, Thairoil conducted risk assessments on 100% of our Tier 1 suppliers, as one of our stakeholder groups. The assessment evaluates risks associated with environmental, social and governance (ESG) issues, with the aim of avoiding

risks from business partners that may lead to non-compliance issues, occupational health and safety, business disruption risks and reputational damage. This approach is in-line with the Thairoil Group Supplier Code of Conduct: SCoC.

Thairoil utilize the 7 step Human Rights Impact Assessment and Management (HRIAM) in the assessment of human right risks as follows:





In 2019, Thaioil’s Human Rights Risk Assessment results show that there are 4 main human rights issues as follows:

- 01**
Waste, Water, Health and Safety Management (business partners, subcontractors, and contract workers)
- 02**
Labour Practices and Working conditions (business partners, subcontractors, and contract workers)
- 03**
Normal traffic and construction Traffic (Safety, Security, Environment, Society and community)
- 04**
Safety, Security, Environment, Society and Community (Migrant Workers)

From the human rights risk assessment conducted in 2019, there were salient human rights issues with high level of residual risks in some activities of core business units. Yet, we found that all business units with high human rights risks have mitigation measures in place to control 100% of all risks. The assessment results have been approved by the Thaioil value chain superior and have been discussed by the working group overseeing the implementation of the human rights policy.

Salient human rights issues in 2019



100%
of business units covered in the human rights risk assessments

100%
of supplier companies covered in the human rights risk assessments

100%
of new suppliers completed an electronic self-assessment of environmental, social, and governance issues.

Good Labour Practices (Labour Rights)

Thaioil and Subsidiaries respect the human rights of our employees and other stakeholders through refraining from discrimination on the basis of personal opinions, nationality, race, colour, religion, sex, gender, age, disability, or any other status that is their human right to hold. We apply human rights principles that guarantee fair treatment to all stakeholders in all our business activities, and are committed to eliminate unfair practices, discrimination, threats, and any form of human rights violation.

1. All Thaioil employees from every level and function must have a comprehensive understanding of the regulations related to their line of work and responsibilities. They must strictly comply with these regulations, and seek the consultation of the Legal Department if they have any questions or concerns. Employees should comply with regulations based on accurate understanding rather than personal interpretations.
2. Thaioil and Subsidiaries have compiled and categorized regulations and regulatory requirements of public agencies for employees to study and understand, and also have organized training sessions on related regulations for employees.
3. Thaioil and Subsidiaries must strictly operate according to international human rights principles, increase employee awareness and understanding towards human rights principles such that they may apply these principles in their daily routine duties and responsibilities, and must not support any activity that may violate human rights.
4. If employees have to work in foreign countries, they should study the regulations, cultures, and traditions of the country of destination before traveling to ensure that the products, product samples, equipment, and documents that they may bring with them, as well as the objective of the trip and the

practices of the destination where they intend to visit, do not violate regulations, cultures, and traditions of that country.

As one of the management approaches to achieve one of our material sustainability issues - employee retention - we annually review the compensation and remuneration schemes for employees to ensure that they are competitive with peers and leading Thai companies. We also continue to ensure that we support our employees in enjoying their freedom of association and collective bargaining. In 2019, Thaioil and the Thai Oil Refinery Workers' Union participated in collective bargaining based on a bilateral system that builds on good labour relations. We did not need a third party mediator to mediate any dispute, and were able to reach an agreement regarding working conditions.

25.35%

Total female employees

38.32%

Total female employees in Management positions

42.18%

Total female employees in Junior Management positions

36.36%

Total female employees in Top Management positions

31.37%

Female management in revenue-generating functions

73.83%

Thaioil employees who are members of the Thaioil Refining Union

100%

Executives and employees who received human rights training in order to understand the policy and the company's rules and regulations, to prevent human rights violations in the workplace and prevent involvement in violations of business partners in the value chain

Good Community Practice (Community rights)

Thaioil gives importance to working with communities around the operation sites, by using the Principle of Operation (3 Synchronizations), consists of Thaioil Group representatives, representatives of all 10 community leaders around the refinery, and government agencies such as Laem Chabang district, Laem Chabang Hospital, and educational institutions. According to the 5-together conceptual framework, namely think-together, act-together, correct-together, learn-together, and develop-together for the community to participate in their own community development to become a strong self-reliant community. It is also a channel to communicate progress of construction project expansion, and listen to opinions from the community, as one of our salient stakeholder groups, to make appropriate adjustments.

In addition, Thaioil gives importance to conducting an environmental impact assessment in every key project, and ensures that mitigation plans are available, as well as considers opinions of communities as key stakeholders. In 2019, all key projects have been subjected to public hearing, as required by the law.

Grievance Mechanisms

Thaioil and Subsidiaries' grievance mechanisms have been designed to receive and manage grievances from all stakeholders throughout our value chain, including any concern our business partners may have. It is our hope that through transparently accepting and responding to submitted grievances and concerns, we may appropriately handle conflicts and secure our social license to operate, as well as strengthen relations with our business partners.

Stakeholders may access grievance mechanisms and submit grievances or concerns by explicitly noting the confidentiality of the document(s) and addressing the document(s) to the Chairman of the Board, Chairman of the Corporate Governance Committee, Chairman of the Audit Committee, Chief Executive Officer and President, Secretary, or to cgcoordinate@thaioilgroup.com.

Additionally Thaioil has direct complaint channels classified for different groups of stakeholders. These channels enable Thaioil to monitor and collect feedback. For suppliers, another channel is available to receive complaints, and questions from website or email at srm@thaioilgroup.com.

For communities, Thaioil has a center to directly receive notifications and complaints, with integration of relevant internal business functions under the operating procedure, when the complaint arises regarding to occupational health & safety and environment. This enables the implementation of risk prevention and mitigation measures to resolve the issues at the root causes as a consequence of the changing contexts. Through the utilization of Voice of Stakeholder (VOS) management system to manage complaints from stakeholders, as a primary tool of engagement, allows for responsive and efficient compliant handling arising from normal operating conditions and expansion projects. Progress of the resolution will be regularly communicated to the community. Ultimately, understanding and reducing community concerns are of utmost importance for Thaioil to manage, maintain, and protect the rights of all stakeholders.



0 Complaints about human rights violation from employees in 2019
case

0 Complaints about human rights violation from business partners in 2019
case



1 Complaints regarding impact on community in 2019
However the complaint was thoroughly reviewed and investigated in accordance with the company's complaint-making process. The correction action was made, additional protective measures were introduced, and the complainant was notified
case



Value Protection

Value Enhancement

Sustainable Value Creation

Climate Change Risk

Challenges, Risks, and Impacts

With the ratification of the Paris Agreement in 2016, Thailand confirmed its commitment to maintain global temperature increase under two degrees Celsius. Since then, the Thai government has set a target of 20-25% greenhouse gas emissions reduction from baseline year 2015 by the year 2030, and is currently in the process of drafting the National Climate Change Act, or the Global Warming Act, which will come into effect in the future. The new legislation will cover economic mechanisms to incentivize greenhouse gas reduction in the private sector, as well as measures to promote change in citizens' behavior and lifestyles and to include citizens in the climate change solutions. These measures will range from developing and promoting public transportation to advance the Thailand Integrated Energy Blueprint in the long-term.

Climate change has become a priority issue of increasing interest to our stakeholders. We have witnessed this trend from movements in the civil society sector, investors, and other agencies that have pushed for climate action, illustrated by initiatives such as the Science-Based Targets Initiative (SBT) and the Task Force on Climate Related Financial Disclosures (TCFD). These initiatives are evidence of expectations of the oil and gas sector in managing business activities to confront developments in technology that drive society towards a low carbon society, such as energy conservation technology and alternative energy technology.

All of the aforementioned risks, with the implicated regulatory risks from new policies, rules, regulations, and requirements, and the physical risks in managing water consumption for production processes and other expansion projects, along with changes in technology, will affect Thairoil's business transition.

Management Approach and Performance

Governance and Oversight

Thairoil Group regularly reviews organizational strategy in the context of climate change every year under the leadership of the Board of Directors, and assesses potential impacts to our business through a risk management process. We also track corporate key performance indicators related to climate change. The energy intensity index (EII) in particular is used to evaluate performance of executives and employees, and performance is reported to the Board.

Commitment

Thairoil Group is committed to managing climate change in alignment with the company's Environmental Master Plan and have taken actions ranging from establishing policies on quality, security, occupational health and safety, and environment (QSHE) and corporate social responsibility (CSR), to assessing climate risks through enterprise risk management processes. The short-term and long-term strategic plans were developed to support our business excellence.

Furthermore, we have prepared for business transformation driven by climate change impacts. For example, we continue to monitor government policies and regulations, manage water consumption to prevent potential impacts from water scarcity, support research and development initiatives, and implement projects that efficiently increase energy efficiency and reduce oil loss. We have also joined the Thailand Voluntary Emission Reduction Program (T-VER). In the near future, we will operate the Clean Fuel Project with best-in-class technologies and support research initiatives to reduce impacts to the environment and communities. For long-term growth, Thairoil Group has determined a strategic direction towards investing to find new business alternatives. The Seed the Option strategy will lead us in increasing investments in innovation and green businesses in the future.

Target

(Developed based on business extended plan 2018, covering core business and investment in Clean Fuel Project)

- Reduce 4% of greenhouse gas from business as usual scenario in baseline year 2017 by 2022
- Reduce 6% of greenhouse gas from business as usual scenario in baseline year 2023 by 2030

Risk Identification and Assessment

Thaioil Group uses a risk-based approach to assess climate change impacts on business operations. The assessment covers regulatory risks, physical risks, and transition risks.

Risk Management

01 Regulatory risks that may impose impacts on current operations and future investments include the drafting of the National Climate Change Act, or Global Warming Act, which will come into effect in the future, greenhouse gas reporting requirements, private sector responsibilities in supporting the achievement of national greenhouse gas reduction targets (nationally determined contributions: NDCs), future use of economic mechanisms such as carbon taxes and emissions trading, and improvements in public transportation.

Thaioil Group has established a strategy to control and mitigate our greenhouse gas emissions to achieve short- and long-term targets, in efforts to preserve the environment and support the government's actions to reduce greenhouse gas emissions. In 2012, we established the Energy and Loss Committee, a committee comprised of representatives from operations and management, to assess risks and develop action plans to control production and operations, and systematically monitor performance.

For the short-term strategy for 2019-2022, Thaioil Group has benchmarked our energy efficiency performance with other international companies as a gap analysis exercise to identify opportunities to improve and appropriately plan for operating energy efficiency improvement projects (see more details on 2019 projects in the "Operational Eco-Efficiency" chapter). We have also controlled fuel consumption in the production process, with the aim to increase the share of consumption from fuels with lower greenhouse gas emissions compared to fuels with higher greenhouse gas emissions. In addition, Thaioil is currently in the process of considering use of carbon pricing in our investment decision.

For the long-term strategy, Thaioil Group is preparing for the Clean Fuel Project (CFP) by selecting highly efficient technologies and ceasing production in old production units. This will allow us to achieve significant increases in energy efficiency in our oil refinery plants. Additionally, the CFP contributes to greenhouse gas emission reductions, as it does not depend on fuel oils, which has high greenhouse gas emissions in the production processes, and can process fuel oil into products with higher values, in effect directly reducing greenhouse gas emissions from end consumption.

Furthermore, in 2019, Thaioil group closely monitors development in greenhouse gas reporting policies and government economic incentives through studying and participating in different government projects that will meet societal expectations. The example of these projects include as follows:

Using information gathered from the **Life Cycle Assessment (LCA)** as basis for registering all products produced in the Thaioil refinery in the Product Carbon Footprint in order to ensure that information regarding product greenhouse gas emissions is readily available for consumers to support their decision-making process;

TOP SPP Company Limited had participated in the **Thailand Voluntary Emission Reduction Program (T-VER)** organized by the Thailand Greenhouse Gas Management Organization (Public Organization);

Continuously participating in the **Low Emission Supporting Scheme (LESS)** to support organizational and national efforts to reduce greenhouse gas emissions through initiatives that increase energy efficiency; and

Implementing a renewable energy project - which will be installed and ready to be used in 2020 - at the Engineering Building Center to support renewable energy consumption as a means of reducing greenhouse gas emissions and mitigating risks from new regulations in the future.

Implementing **TOP CE** project - which is initiated by Thaioil Group to drive Circular Economy - to support the efficiency of resource utilization and reduce greenhouse gas emissions.

02 Physical risks that may have effects on water sourcing for current production process and for investing in Clean Fuel Project in the future.

Thaioil Group has established a holistic water management system to minimize potential risks that may affect our production process and our stakeholders, including the identification of methods to source water during periods with water shortage risks. Our area of production is located in eastern Thailand, where data from the Aqueduct Water Risk Atlas developed by the Water Resource Institute suggests that drought risk is moderate. Nonetheless, Thaioil Group has continued our proactive management approach with the PTT Group Water Committee of the eastern

region, and the Water War Room of the East, to assess the water scarcity, forecast rainfall and water demand, or water availability, and develop preventive measures and responsive measures in case of a drought crisis. We also have business continuity plans management for crisis management.

Furthermore, our water management system has been strengthened with priority given to communities. During droughts, the authorities will first supply water to surrounding communities. Then, only after their needs for daily consumption and agriculture activities are satisfied, the authorities will supply water to Thaioil Group. To mitigate such a situation, Thaioil Group has installed a total of six desalination units that are readily available to operate to reduce our freshwater consumption and support our water demand. In 2019, Thaioil Group has implemented a "Saving Water through Water Crisis 2020" initiative to build an awareness that will encourage for water conservation in the upcoming drought crisis. In addition, we have conducted additional research projects regarding initiatives to reduce water scarcity risks (see further information in the water management section in the "Operational Eco-Efficiency" chapter),

Moreover, we have implemented initiatives to support the Clean Fuel Project (CFP) in the future, and prepared readiness for potential water shortage. Examples include construction of the new reservoir - now completed - and water pipeline from NongKor Reservoir at Chonburi Province and the NongPla Lai Reservoir at Rayong Province. The pipeline construction has been undertaken in collaboration with the water distribution company, and is currently in process.

03 Transition risks stemming from fast advancements in technology that will facilitate replacement of oil consumption with alternative energy may affect business operations. It can be seen that presently, the development and improvement of alternative energy technology has speedily driven oil substitutes in various types and forms, such as electronic vehicles and hydrogen fuels. Governments in several countries have passed different rules and regulations that together promote use of

alternative energy in replacement of oil, leading to several car-manufacturing companies in Europe setting targets to reduce or cease manufacturing internal combustion engines vehicles. In the past year, under the national plan to develop infrastructure to support electric vehicles in Thailand (EV Plan), the government has supported pilot plants in producing lithium-ion and lithium-sulfur batteries (500 packs per day capacity). This collaboration with the private sector will produce batteries that can be tested in both land and water vehicles. The government promises benefits in the form of corporate income tax cut to private sector parties who invest in this initiative.

Meanwhile, a number of public transportation groups have commenced pilot projects to shift towards the electric system. With these factors in action, the oil industry may not be able to adapt accordingly and may face decline in income and growth rates in the long term. Thus, Thaioil Group has determined a plan to make the necessary adjustments in gasoline production to ensure that future production will appropriately respond to forecasted demand reduction. We have also made improvement plans regarding production efficiency through an investment strategy that prioritizes diesel and aviation fuels, which will be realized through the CFP.

Additionally, we have increased the share of investments in businesses that are not dependent on oil prices, and embarked on portfolio restructuring to strengthen our competitive ability. To accomplish this portfolio restructuring, we are currently seeking new investment opportunities, especially for specialty products, implementing the New S-Curve Project, as well as studying investment opportunities in startup businesses, which we will may pursue through venture capital investment. We aim to invest in developing technology that increase operational efficiency, businesses and technologies that are environmentally-friendly and human-oriented, and businesses and technology that will replace hydrocarbons, to ultimately secure revenue growth rates and meet Thaioil Group targets.

Direct Greenhouse Gas Emission Reduction (Scope 1)

In 2019, Thaioil Group reduced greenhouse gas emissions through investing 28 million THB in 15 projects to increase energy efficiency. Our initiatives resulted in a total reduction of 84,265 tons of carbon dioxide equivalent. We have also continued studying the environmental impacts of refinery's key products, including conducting life cycle assessment (LCA) of them. In this study, we have now reached the last stage of data verification. The information gathered will then serve as a carbon footprint database for our products. In the future, we aim to expand the scope of study to cover all companies within Thaioil Group, and apply this information in coming up with plan for effective greenhouse gas reduction. Additionally, we have studied carbon pricing to complement our investment decisions and ensure our readiness to participate in carbon credit trading in the future.

Thaioil Group has also implemented renewable energy projects and participated in greenhouse gas reduction activities, as briefly noted above, to support greenhouse gas reduction within Thaioil Group and for national greenhouse gas reduction targets, such as:

The Solar Rooftop for Sustainability Project at the Engineering Building Center to promote renewable energy consumption and greenhouse gas reduction, which expect to be operated by 2020;

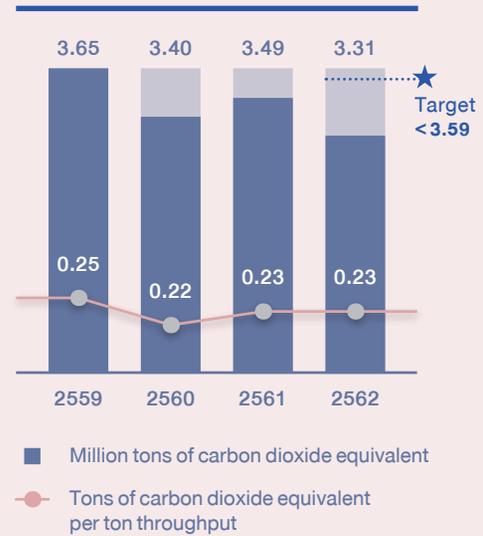
The Low Emission Supporting Scheme (LESS) Project, where we invested in energy conservation activities that improve energy efficiency in Thairoil Group through a total of 7 energy efficiency projects that together reduced 33,121 tons of carbon dioxide equivalent of greenhouse gas emissions; and

The Thailand Voluntary Emission Reduction Program (T-VER) organized by the Thailand Greenhouse Management Organization (Public Organization), where we took part with the 239-MW Combined Cycle Co-Generation Power Plant at Sriracha District, Chonburi Province of TOP SPP Company Limited, which passed the assessment process and obtained certified carbon credits for the reduction of over 327,884 tons of carbon dioxide equivalents of greenhouse gas reduction, and supports the transition to a low carbon society in the future.

TOPCE project - which is initiated by Thairoil Group to drive Circular Economy - to support the efficiency of resource utilization and reduce greenhouse gas emissions in all life cycle of products.



Direct greenhouse gas emissions



Indirect Greenhouse Gas Emission Reduction (Scopes 2 and 3)

Thairoil Group does not have any indirect greenhouse gas emissions (Scope 2) resulting from generation of electricity or steam purchased externally, as none of the production units in Sriracha District, Chonburi Province depend on external energy sources.

As for other forms of indirect greenhouse gas emissions (Scope 3), the Energy and Loss Committee (E&L Committee) assesses risks, establishes action plans, and manages and monitors production and operations to reduce greenhouse gas emissions from indirect sources. Examples of initiatives led by the E&L Committee include an initiative to reduce crude oil loss during transportation of crude vessel to refinery (ocean loss), and an initiative to develop a network of oil pipelines. Both initiatives reduce greenhouse gas emissions generated from production and transportation through vehicles and vessels, respectively.

Additionally, there are controls in place for greenhouse gas emissions from landfill disposal. We have set a target to achieve zero waste to landfills by 2020. The Company also supports employees in using company vehicles in getting to work and other locations within Thairoil Group. Thairoil has standards to maintain efficiency in business travel, as implemented through our car rental contracts, our carpool program, and employee service vans. We also encourage employees to use bicycles for travelling into the production plant and to conduct meetings through video calls instead of commuting to the meeting.

Moreover, Thairoil Group has enforced projects to reduce indirect greenhouse gas emissions through Digital Transformation programs, such as our Digital Workplace, Finance Transform, and Predictive Maintenance programs, to increase machinery efficiency and reduce electricity and paper consumption. We have also studied Green Procurement measures. In 2019, we completed our study of the Pollution Control Department's criteria for determining environmentally-friendly products and services.

In the long term, the CFP, which uses advanced technologies, will also increase the share of diesel and aviation fuels produced, in effect replacing the production of fuel oil, which is lower in value and higher in greenhouse gas emissions. We then expect to see reduction in our indirect greenhouse gas emissions from end-use consumption in the near future.

Last but not least, we have implemented projects for communities and the environment to promote sustainable management of environmental resources and to drive towards a low carbon society way of living. An example is our Renewable Energy Project, a project under the "Sustainable Energy for Health Care" theme where we installed 40-50 MW solar PV rooftop systems for Thanyarak Hospital and Koh Si Chang Hospital.

Fight Against Corruption

Challenges, Risks, and Impacts

Thai Oil Public Company Limited is the largest petroleum refinery operator in Thailand. We have been operating for over 58 years with a commitment to conduct business with due consideration towards and in alignment with environmental, social, and governance (ESG) principles; which underpin by a concrete foundation of honesty, integrity, transparency, clarity, and a strong spirit of anti-corruption. To secure the confidence, trust, and acceptance from all of our stakeholder groups, we believe that this concrete foundation is vital to fulfilling our sustainable development strategies of Strengthen the Core, Value Chain Enhancement, and Seed the Options, and creating long-term returns for all stakeholder groups.

Thaioil recognizes that corruption is a major obstacle for all types of organizations in implementing sustainable development and managing business, economic, and social aspects. Corruption can occur anywhere and at any time, and can take different forms and create varying levels of impact. To manage this challenge, our Board of Directors and executives have placed heavy emphasis on anti-corruption management, and are committed to managing an Anti-Corruption Policy to address the issue. We strictly enforce this Anti-Corruption Policy, and continuously review and evaluate the adequacy of our working processes and practices in order to create an organizational culture of transparency, fairness, code of conduct compliance, and anti-corruption. We take these actions to build stakeholder confidence, strengthen our capacity to respond with short-term and long-term challenges and changing contexts, and to ensure that Thaioil can grow sustainably.

Commitment

Thaioil is committed to operating our business activities with fairness, integrity, transparency, and accountability. We aim to secure and maintain the confidence of our investors and all other stakeholders while increasing business competitiveness and pursuing sustainable development through grounding our activities under the principles of good corporate governance and ethical business conduct. Thaioil has referred to the internationally accepted OECD (Organization for Economic Co-Operation and Development) Principles of Corporate Governance and SEC (Securities and Exchange Commission) and SET (Stock Exchange of Thailand) guidelines to guide our practices. Thaioil's Corporate Governance and Code of Conduct Manual was published and distributed to Directors, executives, and all employees for their ease of accessing, understanding, and implementing all principles in their daily duties and responsibilities. Additionally, Thaioil has also publically disclosed the Corporate Governance and Code of Conduct Manual on our website in order to allow any interested person to study and understand our practices.

Thaioil's Board of Directors and executives recognize the importance of securing good corporate governance and fighting against corruption, which may obstruct the company's ability to achieve its corporate objectives. To meet this imperative, they have established and disclosed Thaioil's Anti-Corruption Policy, alongside roles, responsibilities, guidelines action plans, and measures to fight against corruption, with a clearly declared requirement that



" The Board, the management, and employees must not corrupt nor accept corruption of all forms in any circumstances, covering the business of the Company in every country and in every relevant agency. The Company defines guidelines, operating measures, and roles and duties of responsible persons, as well as regularly monitoring and reviewing the implementation of the anti-corruption policy in compliance with changes in businesses, rules, regulations, and relevant laws."

The Board of Directors and executives have also established guidelines to support anti-corruption measures and ethical business conduct, such as the Code of Conduct regarding conflicts of interest and the giving and acceptance of presents, assets, or other benefits listed in the Corporate Governance and Code of Conduct Manual. This Manual also includes the Anti-Corruption Policy.

With a strong commitment to operate our business activities with good corporate governance practices grounded in fairness, integrity, transparency, and accountability, Thaioil has developed a list of corporate values named POSITIVE for all our employees to apply in their daily duties and responsibilities. The “I” in POSITIVE stands for integrity, and represents our commitment to operate with honesty and fairness. We have also consulted best practices in Thailand and abroad to develop frameworks and mechanisms that can support good corporate governance practices in our operations and reflect the “REACT+E” principles of Thaioil governance. Details are shown below:



Thaioil is aware that neglecting or failing to fulfill our duties in complying with laws, regulations, corporate values, corporate governance principles, and code of conduct will undermine our stakeholders' confidence in us, and may feed misunderstanding about Thaioil's corporate governance processes in the short and long term. For this reason, Thaioil values awareness raising both internally and externally to ensure that the Board, executives, and all employees will not neglect nor fail to comply with policies and practices. This includes reporting conflicts of interest, completing e-learning courses on corporate governance and business ethics, staying informed through

internal magazines and emails, as well as participating in the production of a short drama (Integrity the Series) that communicates and develops the knowledge and understanding of all employees. Ultimately, we aspire to foster a sense anti-corruption consciousness. Furthermore, Thaioil externally communicates important policies and practices through organizing annual supplier conferences and analyst meetings, both of which are channels to transparently disclose information and create mutual understanding between Thaioil and all stakeholder groups.

Management Approach

Assessing corruption risks

Thaioil has set processes to assess corporate governance and corruption risks, including risks of non-compliance with rules, regulations, and corporate governance principles, and risks of complaint response that deviates from our whistleblower procedures. The Company has assessed these risks, and developed a manual that is in accordance with corporate governance principles. The manual has been continuously updated and followed by our people. We also communicate relevant policies and practices, continuously monitor news updates from regulatory agencies, and participate in joint

meetings between the SEC (the agency that has established the new corporate governance code 'CG Code') and other listed companies to keep track of their opinions. We then compare the information we gather with our existing practices to confirm their accuracy and completeness. We also hold planning meetings with relevant functions to develop and improve our management measures, and regularly present the performance from such actions to the Board for their consideration, feedback, and/or determination of risk prevention measures needed to manage such issues.

Promoting REACT+E principles and corporate POSITIVE values

Thaioil has prepared itself to respond to future regulatory changes, especially with regards to the fight against corruption. We recognize that to accomplish our goals, we must start with ensuring internal readiness. The most important factor, we believe, is our people. We have thus organized various events to emphasize the REACT+E principles and the POSITIVE values, campaigning for Thaioil employees to work honestly in order to raise awareness and integrate business ethics into day-to-day operations through creating a corporate culture. Furthermore, Thaioil communicates to all new employees to adhere to and comply with the principles of corporate governance, business ethics, and anti-corruption from the first day of work. This is accomplished primarily through employee orientation, as well as communication and information on corporate governance and business ethics through articles in the Akanee journal (Internal communication journal) and email within the organization on a regular basis throughout the year.

Collaborating with anti-corruption network partners



To demonstrate our determination to fight against corruption, Thaioil has joined the United Nations Global Compact (UNGC). We have applied the 10 UNGC Principles that promote good governance regarding human rights, labour, environment, and anti-corruption in our working processes, and have used the principles to share anti-corruption knowledge, experiences, and practices. The Company has also become a member of the Partnership Against Corruption for Thailand (PACT Networking), an initiative led by the Thaipat Institute.

Thaioil’s membership as a Certified Company of Thailand’s Private Sector Collective Active Coalition Against Corruption, or the CAC, has also been renewed this year. The CAC was established, and continues to be supported, by the government and the Office of the National Anti-Corruption Commission (NACC). Our participation in this program has contributed to significant advancements in developing and improving our practices towards greater transparency and uplifting corporate governance standards, as well as reducing the regulatory risks of being prosecuted under the Anti-Corruption Act 2018. Furthermore, our membership and active participation in the CAC demonstrates our commitment to fight against corruption in various ways.

Promoting an internal corporate governance culture and enhancing an external good corporate governance and anti-corruption image



In 2019, Thaioil joined other PTT Group companies in organizing the PTT Group CG Day 2019 event under the theme “Digitalization: Challenge for the Governance”. The event served to promote and emphasize application of good corporate governance principles within employees of all levels. It also reiterated the creation of a transparent corporate culture, and fostered solidarity that will bring the organization towards sustainable growth. Activities organized during the past year reflected the Company’s determination in driving the organization in line with corporate governance principles that are changing with the times. We have introduced modern technology and information systems to enhance the work process for excellent management, and prepared for stable growth with our stakeholders sustainably. The event consisted of three main parts - an exhibition of corporate governance of PTT Group, followed by a panel discussion of senior executives on the topic of “Corporate Governance in the Digital Age”, and then concluding with the game show “Mysterious Numbers to Overcome CG”.

In addition, Thaioil organized activities to promote corporate governance principles for our stakeholders. These are shown below:

01

Thaioil produced and developed “Integrity the Series”, a series of short skits that promote and create awareness and understanding of ethics within the organization, resulting in continuous practices that become the corporate culture - i.e. honesty, fairness, compliance, professionalism, motivation, and respect.



02

Thaioil reviewed and included the Corporate Governance Policy, Anti-Corruption Policy, and Whistle-Blowing Policy and Procedure as part of the TOP Way of Conduct to drive standardization of performance in corporate governance throughout our businesses.

03

Thaioil communicated the No Gift Policy to employees of all levels through internal channels such as our website, the corporate e-newspaper, the internal magazine, and other signs in our offices in Bangkok and Sri Racha. We also organized and sent out copies of “Request letter to avoid giving gifts to executives and employees of Thaioil and Subsidiaries” to all our suppliers, customers, financial institutions, and other business partners. We believe that these efforts should help reduce behavior that is not in line with our anti-corruption policy, and will promote the equitable treatment of all stakeholders.



04

Thaioil developed the Supplier Code of Conduct to establish mutual understanding between Thaioil and Subsidiaries and our suppliers with regards to sustainably operating business activities. We used various means and activities, such as the PTT Group CG Day, to communicate our corporate Governance Policy, Anti-Corruption Policy, and other practices to our suppliers. Our aim is to ensure that all of our suppliers are able to refer to the principles and practices that we use to achieve good corporate governance that complies with our standards, and are ultimately able to apply the principles to improve their own performance.

05

Thaioil invited target suppliers to attend the CAC Executive Briefing for Small and Medium Enterprises (CAC SME Executive Briefing: CAC SME) organized by the Thai Institute of Directors (IOD) to strengthen the coalition against bribes in the private sector. The initiative shared experiences in implementing certification projects for large companies, and is also supported by the Center for International Private Enterprise (CIPE) and the Thai CG Fund.



06

Thaioil conducted sharing and exhibitions on corporate governance and anti-corruption at the annual Thaioil Group supplier seminar event, the SRM Seminar 2019.

07

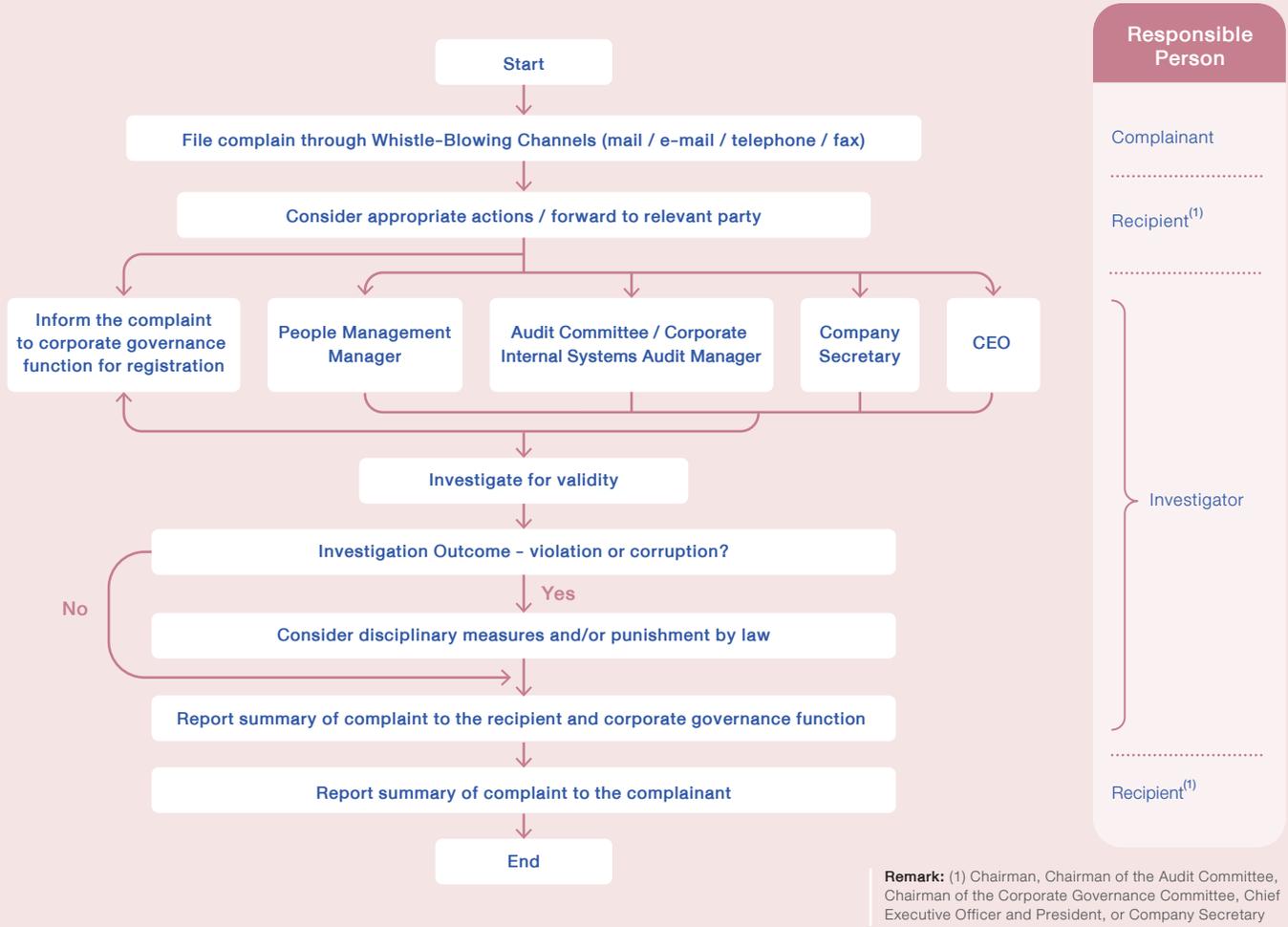
Thaioil held exhibitions in seminars of various departments to publicize our actions in corporate governance and anti-corruption. Some examples of events we attended are the 8th Integrity Award 2019, the Annual General Meeting 2019 of the Thai Institute of Directors, and the CAC National Conference 2019: Innovations in the Fight Against Corruption.

08

Thaioil communicated all policies, including the whistle-blowing procedure, whistleblower protection mechanisms, and mechanisms to monitor and investigate complaints that are in line with Thaioil’s Code of Conduct, to all business stakeholders through our website and various activities such as the quarterly analyst meetings to report performance and the quarterly investor meeting in the “Opportunity Day” event of the Stock Exchange of Thailand.

Whistleblower Procedure

To increase the clarity and effectiveness of our whistle-blowing procedure, as well as follow the Stock Exchange of Thailand’s guidelines, Thaioil has developed a whistle-blowing process that outlines whistle-blower protection mechanism and mechanisms to monitor and investigate complaints that are in line with Thaioil’s Code of Conduct. The process is outlined below:



Cases that count as non-compliance or illegal conduct and cases that pose risk of corruption are handed to the Corporate Internal Systems Audit Department for investigation. The Department is an independent body that reports directly to the Audit Committee, and is tasked with investigating and reporting all findings to ensure that stakeholders can remain confident in Thaioil’s ability to appropriately respond to all complaints.

Investing, Responding, and Monitoring Complaints

Thaoil closely monitors performance related to complaints in order to improve the efficiency of our working processes and our complaint response. We have plans to increase employee awareness of the whistleblowing procedure.

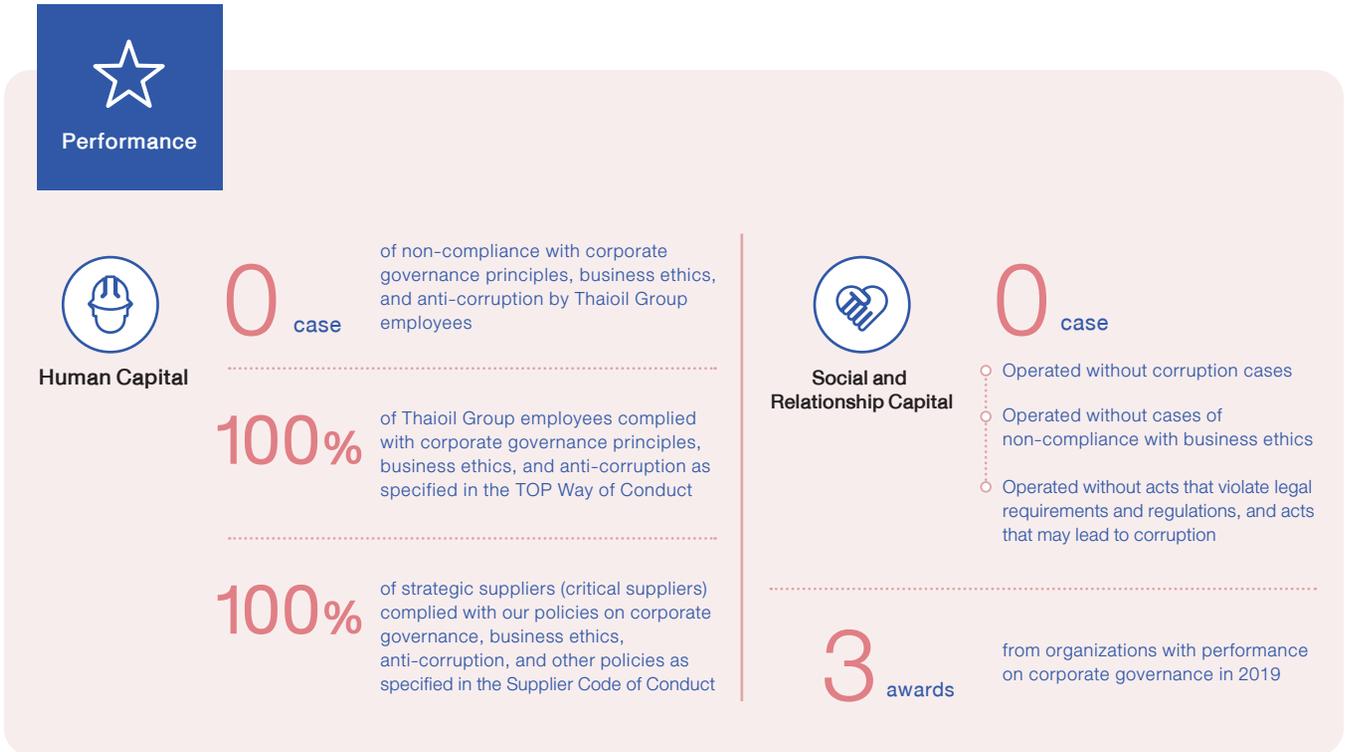
In 2019, Thaioil received complaints through the company’s whistle-blowing channels in a total of three cases, and divided into two separate complaints. The first two case were related to the complaints from the impacts due to the company’s owned

operations and the last case was related to the company’s internal processes, all of which had been investigated in accordance with our whistle-blowing process. It was found that the complaints did not count as non-compliance or illegal conduct. There were no fines, non-monetary liability, nor case of corruption. However, the observation noted from the investigation would be further integrated into the company’s whistle-blowing process in order to strengthen the process further.

Preventing conflicts of interest

Thaioil requires that all employees report conflicts of interest through the Conflict of Interest Disclosure Electronic System every year. This platform serves as a channel for potential conflicts of interest in the organization. In 2019, 100% of our

employees responded to the conflict of interest disclosure forms. There were two reported cases of potential conflicts of interest. However, after these cases were thoroughly reviewed and investigated, it was found that none of them posed conflicts of interest with Thaioil's business activities.



In 2019, Thaioil operated under the principles of good governance by creating awareness and understanding for Thaioil Group employees and business partners of different groups through various channels, including internal communication, Thaioil's website, analyst meetings, and exhibitions in various events. Thaioil also has plans to continuously develop and promote awareness and understanding of various practices, as well as researching for new approaches and technologies to reach the largest group thoroughly and effectively. We have been recognized for our efforts, as reflected in the national and international awards we have received, including:

International Recognitions



Awarded by the Alpha Southeast Asia magazine: The Strongest Adherence to Corporate Governance (Country) Award

National Recognitions



Awarded the Transparent Organization Award at the 8th NACC Integrity Awards 2019 organized by the Office of the National Anti-Corruption Commission



Scored 98 points, the highest score of all listed companies, in the Corporate Governance Report of Thai Listed Company 2019 (CGR) of the IOD, and maintained the "Excellent" level (Excellent: 90-100 points), the highest level, for the 11th consecutive year

Value Protection
Value Enhancement
Sustainable Value Creation



Sustainable Procurement



Operational Eco-efficiency

Value Enhancement

To achieve long-term value chain enhancement amidst fluctuations in the petroleum and petrochemical businesses, Thaioil must be able to improve production efficiency and increase capabilities in refining a variety of crude oil types, conserving energy to ensure operational eco-efficiency, and refining oil and produce chemical products that are up to standards in response to the changing demands of the customers and end consumers. Value Chain Enhancement also encapsulates the management of supply chain efficiency, including capacity building, environmentally-friendly or green procurement, and extending towards new markets. This section of the report, therefore, includes material matters that are becoming increasingly significant to Thaioil's ability to build competitive advantage in our core business and Strengthen the Core, and support Value Chain Enhancement to various chemical businesses in the future.



Important strategies



Manufactured Capital

Enhancing operational efficiency and flexibility in oil refining in order to prepare for potential regulatory changes.

107%
refinery capacity



Natural Capital

Enhancing operational eco-efficiency in order to create a competitive advantage.

1,396,728
gigajoules/year of energy consumption reductions resulting from energy efficiency projects



Financial Capital

Enhancing efficiency of the supply chain management in order to reduce production costs.

309 million THB in cost savings resulting from energy conservation projects
53 million THB in cost savings from collaborating with partners to source crude oil



Intellectual Capital

Enhancing knowledge in the area of energy and engineering in order to generate revenue and reduce production costs.

15 energy efficiency projects that increased energy efficiency in the production process



Social and Relationship Capital

Enhancing quality of the supply chain management in order to increase operational capabilities in the energy

100% of new suppliers that have signed the Supplier Code of Conduct and responded the ESG self-assessment questionnaire

Operational Eco-Efficiency

Challenges, Risks, and Impacts

Thaioil Group recognizes the various external factors and environmental changes facing the world, including the limitation of natural resources, increasingly severe air pollution in several areas, increasing demands for freshwater for consumption, as well as significantly larger amounts of waste generated, that have resulted from socio-economic growth. These factors, alongside increased expectations from stakeholders regarding environmental management, have resulted in several countries around the world announcing measures to respond to these challenges. One example is the European Commission establishing new directives to oblige member states to take initiatives such as increasing waste recycling and banning single-use plastics to move towards a circular economy. Researchers from Gartner, a renowned consultancy and research company from the United States, predicts that as consumer and shareholder preferences move towards sustainability, circular economy will replace linear economy by 2029.

Furthermore, incidents of marine animals dying from plastic waste, such as the deaths of Mariam the dugong and the whale in Songkhla Province in Thailand, have gathered public attention on waste management in Thailand. The circular economy model has emerged as a holistic solution to these issues. In August 2019, the Ministry of Commerce of Thailand announced its commitment to drive the Thai economy towards the circular economy.

Commitment

In line with Thaioil Group’s commitment to control and mitigate environmental impacts, we have adopted the circular economy concept for our production process – ranging from refinery unit design, selection of suitable technology, increase efficiency of water and energy consumption, to management of industrial wastes and air pollution. These efforts are done to mitigate risks and impacts that may occur both in the short and long run.

In 2019, Thaioil Group has studied, developed plans, and implemented various projects – the examples of these projects aim to collectively reduce energy consumption, increase of renewable energy (i.e. solar energy) consumption, increase water consumption, and control pollution at source (i.e. emission, effluent and waste). Furthermore, a proportion of waste to landfill has been controlled as well as creating added value for waste in order to increase efficiency in resource utilization and minimize environmental and social impacts. As a result, the company has set the following targets regarding sustainable environmental management as follows:

Energy efficiency benchmarking in oil refining industry

Solomon Benchmarking result for oil refining business in Asia-Pacific

Target 2019

2nd Quartile

Long-Term Targets by 2023

1st Quartile

Total freshwaste withdrawal

Target 2019
Less than

7.10 million cubic meter

Waste to landfill

Target 2019
Less than

5%

Target by 2020

0%

Management Approach and Performance

Thaioil has adopted Circular Economy concept as a management approach that covers the entire product life cycle, and implemented through engineering analysis and design that encapsulates the entire production process, from transporting the crude oil into refining processes and then managing waste from operation. Integration management across various production units are conducted comprehensively to ensure the maximization of resource utilization (i.e. energy and water utilization) and the minimization of environmental impacts from pollutants. Thaioil also promotes the use of renewable energy, such as solar energy. We have also designed the Energy Recovery Unit (ERU), which can use oil sludge from the refinery units as raw material for electricity generation in the future.

Natural Resource Management in Production Process



Energy Management

Thaioil Group's energy consumption for 2019 was 30.7 million gigajoules, which improved by 2.85% from the previous year, thanks to the major turnaround and implementations of energy efficiency improvement projects. A total of 15 energy efficiency improvement projects were implemented, worth a total of 28 million THB of investments, which collectively reduced energy consumption by 1,396,728 gigajoules, equivalent to 84,265 ton carbon dioxide per year.

In 2019, Thaioil Group have implemented key energy efficiency improvement projects as follows:

- Improved cleaning of heat exchangers at Crude Distillation Units - 1, 2, and 3 to reduce energy usage and ensure fully refinery capacity;
- Injected Anti-foulant in heat exchangers at Crude Distillation Unit - 3 to reduce fuel consumption;
- Reduced volume of hydrogen used in reactors to reduce energy consumed at Hydrocracking Unit - 1;
- Changed catalysts in the Continuous Catalyst Regeneration Platformer Unit - 1/2 and improved production units to increase the maximum production capacity by 5%, resulting in higher capacity to produce gasoline and aromatics, while reducing energy consumption;
- Changed catalysts at Hydrocracking Unit - 1/2 during the major turnaround period, resulting in higher capacity to produce jet fuel and diesel, while reducing energy consumption;
- Installed a new set of ejector, which is smaller in size, at vacuum distillers, to reduce the moderate-pressure water vapor consumption by 1 ton per hour;
- Installed a new set of burner for oil burning furnace to save expense on energy;
- Changed the adsorbents at Parex unit and changed the catalysts at Isomar unit to increase the production capacity of Thai Paraxylene Company Limited by reducing the loss of xylene in production process and increase energy efficiency by reducing the volume of extracor required at Parex unit;
- Implemented initiatives to improve energy efficiency in production process, such as reducing pressure at distillery columns for Kerosene separation, reducing pressure of stripper, and reducing energy consumption of the finishing columns in LAB production units;
- Utilized heat recovery from gas turbine generator for steam generator at TOP SPP Limited Company. This recovered heat can produce high pressure steam instead of direct fuel combustion.



Figure1: Continuous Catalyst Regeneration Platformer Unit - 1

The project that contributed most to energy conservation was changing catalysts at Continuous Catalyst Regeneration Platformer Unit - 1/2, which enabled reduction in energy consumption by 595,576 gigajoules, equivalent to 38,527 tons carbon dioxide per year, or 45% of the total energy saving.

Furthermore, there are other energy conservation initiatives in place within the office. This consists of promoting and raising employees' awareness and understanding regarding the importance of energy conservation through different projects, such as Energy Saving & Relaxing for You, 'Energy and Loss' Column in internal magazine, and communication through bulletin boards in offices.

Performance



Manufactured Capital

Energy consumption reduced from last year around

2.85%

and maintained energy efficiency performance at 2nd Quartile group comparing with companies in Asia-Pacific



Financial Capital

Operational cost saving at

309 million THB

from investment in energy efficiency improvement projects



Natural Capital

Reduced greenhouse gas

84,265

tons carbon dioxide equivalent per year from energy efficiency improvement projects

Energy Intensity Index (TOP, TP, TOP SPP)



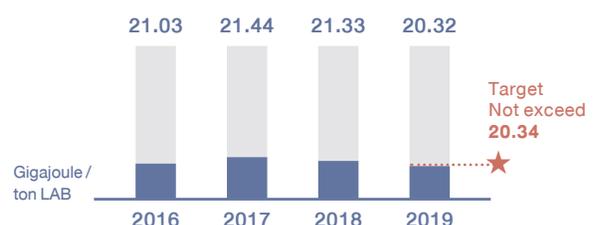
Energy Intensity Index (TLB)



Energy Intensity Index (TPX)



Energy Efficiency (LABIX)



In 2019, Thairoil Group received a shield of honor for the Thailand Voluntary Emission Reduction Program (T-VER), organized by the Thailand Greenhouse Management Organization (Public Organization), for the "239-MW Combined-Cycle Co-Generation Power Plant" project of TOP SPP Company Limited. And, a certificate of honor of Low Emission Support Scheme: LESS for energy efficiency improvement activities of Thai Oil Public Company Limited, which aims to contribute to reduction in greenhouse gas emissions.

Based on results of the Solomon Benchmarking on energy efficiency in 2018, Thai Oil Public Company Limited was able to maintain 2nd Quartile in comparison to other oil refining companies in Asia Pacific. With the completion of Clean Fuel Project, Thairoil Group will be able to increase its competitiveness that will enable the company to compete for the 1st Quartile. As for Thai Lube Based Public Company Limited, the company was able to maintain its position within the 1st Quartile group compared with other lubricant manufacturers globally. And, after Thai Paraxylene Company Limited has completed its upcoming project to increase energy efficiency by changing the adsorption at the Parex unit and catalysts in the Xylene isomerization process unit during a major turnaround, the company is expected to result in the energy efficiency level of the 2nd Quartile group in accordance to a benchmarking report by Phillip Townsend Benchmarking.



Water Management

Thairoil Group has an integrated water management framework based on the 3Rs (Reduce Reuse Recycle) strategy to ensure water efficiency in the production chain through projects such as continuously increasing cooling water circulation. Furthermore, in 2019, Thairoil Group has implemented a "Saving Water through Water Crisis 2020" initiative to build an awareness that will encourage for water conservation in the upcoming drought crisis, and conducted studies for additional water conservation efforts, as detailed below:

- Process changing for the unit of hydrogen sulfide and carbon dioxide removing from wastewater from sour water stripper unit 2 to unit 1, which allows for condensate recovery;
- Recovery of condensate from generator G-5001/2/3/4;
- Installing a new filtrated water pipeline for Thai Paraxylene Company Limited in replacement of the old pipeline, which had damaged; and
- Reducing backwash cycle of cooling tower filters (Q-4707/08).

- Recovery of blowdown water from cooling tower units for TOP SSP Company Limited;
- Conversion of seawater to freshwater through reverse osmosis (RO) or Sea Water RO;
- Conversion of blowdown water from cooling tower units to fresh water through reverse osmosis (RO) or Blowdown RO; and
- Conversion of wastewater from Effluent Treatment Plant to fresh water through reverse osmosis (RO) or ETP Water RO.

Additionally, Thairoil has conducted projects to increase stability in raw water management, such as construction of new raw water pipelines, construction of water storage with new water pump system, as well as the implementation of a project to improve drainage for flood management at the refinery and the surrounding area. This includes implementation of Desalination Unit to help increase Thairoil's usage for renewable water resource, or seawater, as opposed to raw water from natural resources. This helps reduce risks from water scarcity.



Wastewater Management

Thairoil strictly controls the quality of discharged water to be better than that required by laws and regulations before discharging outside our refinery. To reduce impacts to surrounding environment and community, the 3Rs strategy has been conduct to reduce water consumption, and as a

result, reducing wastewater discharge volume. The design considers most effective use of resource and energy, as each type of wastewater requires different levels of treatment. Then wastewater is separated into three types to reduce resource and energy consumption as follows:

- Process effluents;
- Continuously Oil Contaminated (COC) water: water used to wash or rainwater runoff at production site; and
- Accidentally Oil Contaminated (AOC) water: rainwater runoff at Thaioil Group’s production site, or water used to wash with no oil leakage, water from fire drills, water from cooling tower, and water from steam generators.

In addition, Thaioil Group has conducted additional feasibility studies on the water recovery in order to reduce the consumption of fresh water, and increase the proportion of waste utilization that will enhance the value of waste under the principle of Circular Economy. The example of these studies include: conversion of seawater to freshwater through reverse osmosis (RO) or Sea Water RO; conversion of blowdown water from

cooling tower units to fresh water through reverse osmosis (RO) or Blowdown RO; and conversion of wastewater from Effluent Treatment Plant to fresh water through reverse osmosis (RO) or ETP Water RO.

Moreover, Thaioil Group continues to regulate and monitor treated wastewater throughout the day, with real-time reporting of the Chemical Oxygen Demand Online (COD Online) to the Department of Industrial Works. We also monitor wastewater quality by Thaioil Group laboratory, with inspection conducted by independent third parties. These processes are to ensure that the treated wastewater we discharge is of higher quality than required by regulatory standards. Furthermore, Thaioil continues to prioritize human capital development, such as providing trainings for operators in wastewater treatment system, to enhance the capacity to manage wastewater efficiently.



Performance



Natural Capital

30%

of freshwater consumption replaced by distilled water from desalination

2.45%

reduction in total freshwater withdrawal

2.55%

reduction in total wastewater discharge

Total water consumption for industrial use

- Million Cubic Meters
- Cubic meters per ton refinery throughput



Total freshwater withdrawal

- Million Cubic Meters
- Cubic meters per ton refinery throughput



Total wastewater discharge

- Million Cubic Meters
- Cubic meters per ton refinery throughput



Downstream Natural Resource Management



Air Quality

Thaioil Group prioritizes regulating air pollution impacts. We design and implement technologies that are efficient in international standards, maintain excellent process control, and monitor air quality at source as well as surrounding areas. The monitoring itself is conducted by an external air quality auditor, with data measured in real-time through the Continuous Emission Monitoring System.



Oxides of Nitrogen (NO_x) and Oxides of Sulphur (SO_x) Management

Thaioil Group assesses environmental impacts from NO_x and SO_x, and has set up preventative measures to minimize impacts by designing and implementing highly effective and internationally accepted technologies. For example, we have opted to use the Ultra-Low NO_x burner in replacing old technology for 100% of changeable burners. This enables effective combustion and reduce NO_x emissions.

For SO_x management, Thaioil faces challenges following the International Maritime Organization (IMO) announcing that ships must use fuel with sulfur component lower than 0.5%, from the previous 3.5%, by 2020. This is a challenge for SO_x controlling. Thaioil Group has therefore studied the possibility of re-using the fuel oil as an alternative fuel within our production process, as opposed to distributing it commercially. The shift helps control pollution released from other sources. This is made possible because Thaioil Group has a process technology that is of international standard, such as installation and operation of Sulphur Recovery Unit (SRU), which is the modern technology and has high effectiveness in shifting sulfur from emission to liquid sulfur products. In addition, the current expansion project, Clean Fuel Project that is currently under construction, will install additional hydrogen sulfide removal units, which covers Shell Claus Off-gas Treating Unit (SCOT) and Tail Gas Treating

Unit (TGTU) – remove hydrogen sulfide through utilization of catalysts, absorbents and incineration; Sulphur Recovery Unit (SRU) – converts hydrogen sulfide to liquid sulfur; and Sulfur Solidification Unit (SSU) – converts hydrogen sulfide to solid sulfur. Ultimately, these hydrogen sulfide removal units enable Thaioil to effectively control air pollution that arises from sulfur.

Furthermore, there is also air quality monitoring at source and in the surrounding community areas. Thaioil uses air quality monitoring technology and external air quality auditors. Results are regularly reported through the Environmental Daily Dashboard. In 2019, Thaioil Group continues to prioritize combustible fuels that have low emissions and are more environmentally friendly over fuels with higher emissions. The Monitoring IMO RFO Firing Guideline has been followed as a guideline in controlling and monitoring SO_x volume and smoke from combustion to ensure that the operation do not generate impacts on communities.

Thanks to the above mentioned activities in 2019, Thaioil was able to regulate NO_x and SO_x at levels better than what is required by the standards of the law and control level as specified in the environmental impact assessment (EIA).



VOCs Emission Management

Thaioil is fully cognizant of VOCs, which may affect the health of local communities. We have therefore conducted an environmental impact assessment, and determined preventative mitigation measures, as well as monitor the release of VOCs from the production process. We are able

to detect leak points through the use of VOC leak detection camera. This is in compliance with the laws, and international standards; which are consistent with the United States' Environmental Protection Agency since 2012. This has been Thaioil's efforts to stop the mentioned leakage. We also run a

Vapor Recovery Unit (VRU), whose effectiveness is at 99%, to improve treatment of product logistics-induced VOCs.

In 2019, Thoiil conducted a study on volumes of benzene released at source, such as through Effluent Treatment Plant (ETP), flare, combustion, fugitives, tank and product loading

area. This helps us to identify the key sources and set control measures. This resulted in the closed-system wastewater system project, which is currently in progress, to reduce odor and volume of VOCs. The system is expected to be ready to operate by 2022.



Particulate Matter (PM) Management

In recognition of the prevalence of PM 2.5 in several areas across Thailand, Thoiil Group has organized the Breathe The Better Project (Fight Against PM 2.5 Crisis) using the concept of 4Cs, comprising of Control, Contain, Clean, and Check. The concept is used to manage environmental impacts at source, as well as conducting measures to reduce particulate matter in the surrounding community for the health and well-being of the community and employees, through the following projects as described below:

- Water mist project, in which the project installed water spray system in order to control small dust particles from the construction sites, lorry loading area, and around the community areas.
- Green Road project, the project aims to control dust from transportation, in which road controls have been implemented within Thoiil Group and public roads, through activities as follows: vacuuming Thoiil's lorry loading area and main roads with heavy traffic congestion from the company's expansion project with a vacuum truck cleaning of Sukhumvit Road in collaboration with Laem Chabang Municipal, and cleaning of community streets under the "Kwad sathan thung" project.
- Integrated the circular economy concept under the TOPCE project - which is initiated by Thoiil Group to drive Circular Economy - to apply to the community around the refinery to manage wood chips and leaves, and combining them to produce fertilizer for household use, instead of open burning.



Performance



Natural Capital

3.04%

reduction in NO_x emissions compared with the previous year

5.54%

reduction in VOCs emissions compared with the previous year

NO_x emissions

■ Metric tons
● Tons per million tons refinery throughput



SO_x emissions

■ Metric tons
● Tons per million tons refinery throughput



VOCs emissions

■ Metric tons
● Tons per million tons refinery throughput





Industrial Waste Management

Thaioil Group has systematically managed industrial waste per our Waste Management Procedure. Related tasks are implemented through the Waste Management Committee, which drives management and monitoring of waste at source through the disposal process. Thaioil is committed to achieve our industrial waste management target of less than 5% of wastes disposed to landfill in 2019. The Company has implemented the 3Rs strategy, which focuses on reduce, reuse, and recycle, to help reduce the amount of waste disposed and landfilled in the most effective and efficient way possible. Thaioil also conducts site visits for every company subcontracted for industrial waste management services. The objective is to assess environmental, social, and governance performance, ensuring that our contractors are operating in alignment with Thaioil's Supplier Code of Conduct, and that their waste management meets international standards and poses zero risks on community and environmental impacts.

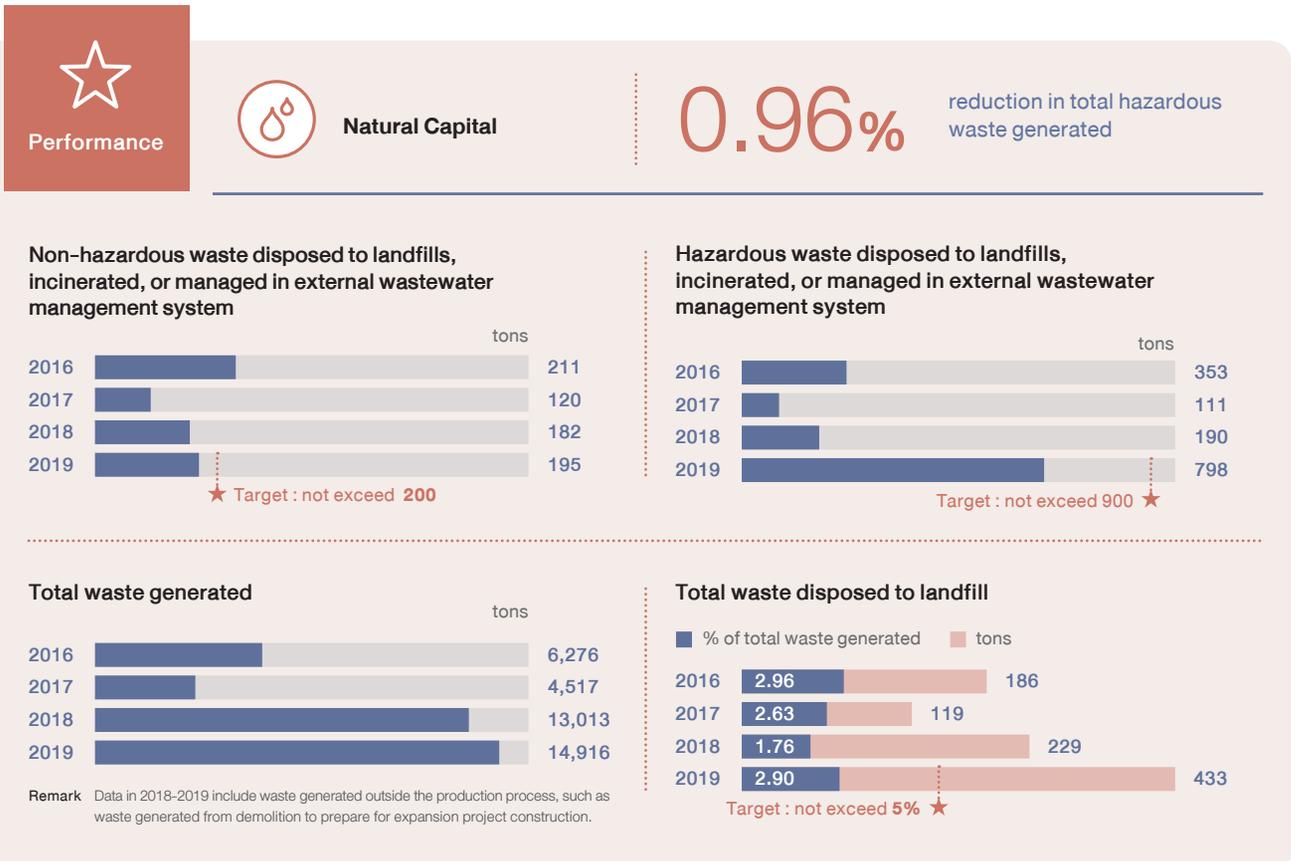
In 2019, Thaioil Group conducted a number of projects aligning with circular economy principles, as follows:

- Fertilizer from canteen waste for green area;

- Study of producing oil from plastic waste by pyrolysis process; and
- Created value-added for Spent Catalyst using Metal Reclamation instead of sending it for disposal, which generated 10 million THB in benefits to the Company.

In 2019, Thaioil Group has conducted a major turnaround for Thai Oil Public Company Limited and Thai Paraxylene Company Limited. However, we still achieved our goal of having less than 5% landfilled waste of total industrial waste. In addition, the Company is also studying how we can shift from industrial waste disposal to re-utilizing it via 3Rs concept, in order to achieve zero landfilled waste target in 2020.

Moreover, Thaioil Group in collaboration with representatives of all 10 community leaders around the refinery and government agencies such as Laem Chabang district, under the Principle of Operation (3 Synchronizations), together engaged in CSR activities – the examples of these activities were collected garbage around the area of ban Ao-Udom, released 999,999 crabs to the wild, and planted sea grass – for the environment and well-being of the surrounding communities.



Value Protection
Value Enhancement
Sustainable Value Creation

Sustainable Procurement

Challenges, Risks, and Impacts

Conducting business with partners in a way that does not create adverse environmental, social, and governance (ESG) impacts is vital to ensuring a strong core business (Strengthen the Core) and to fulfilling our vision to enrich stakeholders' well-being and deliver sustainable returns. To that end, Thairoil has a supplier management process that includes sustainability risk management in the supply chain. In 2019, Thairoil further developed the supplier management system through assessing ESG risks throughout vendor registration, qualification, and performance evaluation processes. Our supplier risk management includes the consideration, identification, and monitoring of regulatory and legal, environmental and social, financial, and operational risks, such as risks of non-compliance with regulations, use of child labour, and adverse environmental impacts in the supply chain, through the use of external information sources.

Commitment

Thairoil is committed to conducting business with our suppliers according to our procurement principles – Clear, Fair, and Professional – and in line with Thairoil Group Supplier Code of Conduct (SCOC). This envelopes environmental, social, and governance aspects. Since 2015, all newly registered suppliers are required to sign their acknowledgement of the SCOC. We have set the following targets to ensure our procurement processes become an integral part in supporting the realization of corporate business strategy. Moreover, Thairoil encourage our critical suppliers and key suppliers in participating in becoming certified members of the Thai Private Sector Collective Action Coalition against Corruption (CAC).

Targets:

- Zero non-compliance in procurement process for important projects which are governed by an internal audit process to demonstrate transparent and fair business conduct

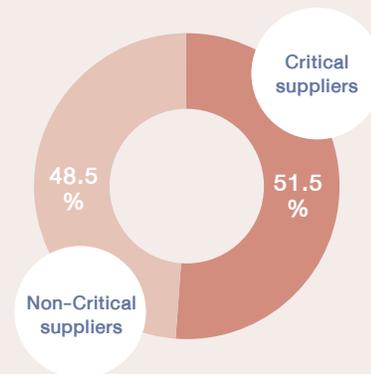
- Acknowledgement of the SCOC by 100% of critical suppliers and 80% of key suppliers by 2019, and acknowledgement of the SCOC by 100% of newly registered suppliers, to manage suppliers in accordance with the SCOC, reduce risks of supplier non-compliance with Thairoil's principles of environment, social, and good governance, and avoid negative impacts on the company's reputation resulting from supplier non-compliance and/or unethical conduct

- Ocean Loss Index, a measurement of crude oil loss during marine transportation, at 0.20 or below by volume in 2019

Management Approach

Thaioil manages procurement processes with a focus towards effective cost management, management of environmental, social, and governance risks in the supply chain, and promotion of green procurement. Moreover, Thaioil prioritizes supplier participation and satisfaction. In 2019, Thaioil conducted business with a total of 1,075 active suppliers, with the share of spending from critical suppliers is shown on the right-hand side.

Spending Analysis 2019



1,075

active suppliers
in 2019

Critical suppliers cover high-volume suppliers, high spending suppliers, and critical component suppliers.

Coverage: crude and non-crude suppliers.

Effective Cost Management

Thaioil has determined targets to reduce costs in the procurement processes. In 2019, these targets were successfully achieved, which enabled efficient cost management, competitive cost prices in the open market, efficiency of the procurement process, and all while upholding our commitment to reduce impacts on the environment. Our main actions are listed below:

- Arrangement of framework agreements: Thaioil uses framework agreements, or long-term contracts of 5-6 years for suppliers of product groups of high value and essential to Thaioil, which help the company to gain access to standard prices and maintain continuous trading. Framework agreements have also helped to establish good relationships with our business partners, and are considered mutually beneficial, which resulted in cost reduction by approximately 30-50%.
- Demand management based on historical data: In planning the procurement process, Thaioil has established and developed an annual contract arrangement with partners. For goods and services with continuous purchase volumes, through the analysis of historical data, providing Thaioil with a bargaining power to negotiate, and reducing the time required for procurement activities, which equivalent to cost reduction by approximately 14%.
- Budget analysis: Budget analysis for various projects is used to develop a sourcing plan for procurement services in order to plan for the delivery of supplies and services in accordance with the project plan.

- Procurement in collaboration with PTT Group: Thaioil's collaboration with PTT Group to be contractual partners for material procurement, providing the company with the higher bargaining of power to negotiate for prices, and ability to generate high value procurement. And, creates good relationship with PTT Group and its subsidiaries, and suppliers.
- E-Auctions: Holding e-auctions have increased the efficacy of the procurement process and reduced the time required and resources needed, leading to cost reduction by approximately 7%.
- PC Functional Competency: To increase employee competency in procurement, the PC Functional Competency training program bring-ins experienced procurement employees to share their experience and knowledge. In 2019, Thaioil has continued this training program, with a total of seven training courses organized covering topics such as supplier selection and assessment, writing and drafting business contracts, supply chain management and logistics, and inventory and warehouse management.
- Co-Loading collaboration: For crude oil sourcing, Thaioil has a co-loading collaboration program with oil refineries across Thailand, especially refineries in the PTT Group, and suppliers, to reduce transportation costs. In addition, we have also reduced procurement costs through using the company's crude oil buoys to distribute crude oil to other refineries in Thailand. In 2019, through collaboration with refineries and suppliers in co-loading, and through distributing crude oil through the crude oil buoys, we were able to reduce expenses by a total of 53 million THB.



Financial Capital

Cost reduction by approximately **30-50%** of important product groups for Thaioil Group through long-term contractual agreements (framework agreements)

Cost reduction of **53** million THB as a result of collaboration with oil refineries and suppliers in co-loading and distribution of crude oil through the company's crude oil buoys



Human Capital

Procurement training for 30 employees for a total of **28** hours

Environmental, Social, and Governance (ESG) Risk Management in the Supply Chain

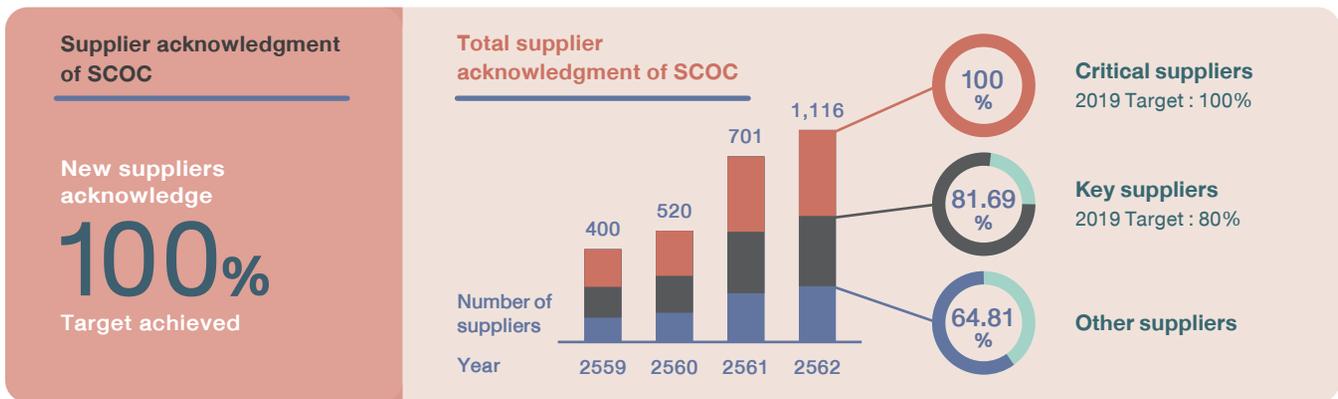
In terms of environmental, social, and governance (ESG) risk management in the supply chain, Thaioil has developed a supplier management system that continuously manages supplier risks based on external information sources, and communicates the company's expectations to the suppliers. The system includes risk assessment, performance monitoring and evaluation, and additional support needs to suppliers to conduct their business sustainably.

1. Thaioil's Expectations Regarding Suppliers' ESG Performance

Thaioil has specified expectations regarding suppliers' ESG performance in the Thaioil Group Supplier Code of Conduct (SCOC). We expect full compliance with the SCOC by every supplier. In order to ensure that suppliers fully understand the SCOC, Thaioil communicates to suppliers through the Thaioil's website and the annual supplier conference. In 2019, the theme of the conference was "Partner for Life".

Moreover, in 2019, Thaioil has communicated the SCOC to crude oil suppliers, and has obtained SCOC acknowledgement from 64% of all crude oil suppliers. Our target is to increase supplier SCOC acknowledgement to 100% by the year 2020.

For non-crude suppliers, Thaioil has proceeded to communicate and increase the number of SCOC acknowledgement from our suppliers. We achieved our target of SCOC acknowledgement by 100% for newly registered suppliers and critical suppliers, and 80% of key suppliers, as shown below:



Remark: Data has been collected since 2015, and does not include crude oil suppliers.

2. Supplier ESG Risk Assessment

Thaioil has a preliminary risk assessment process in the supply chain that covers all suppliers in order to identify suppliers with high ESG risks. The risk assessment is conducted on an ongoing basis for all newly registered suppliers, and once every three years for all suppliers. In 2019, we assessed supplier risks regarding ESG issues as listed

in the SCOC for 100% of newly registered suppliers through the continuous process, as well as 100% of all suppliers through the triennial risk assessment. The risk assessment is conducted based on product and service group, with the relevant function for the respective product or service group is responsible for assessing supplier risk level.

**THAIOIL
GROUP'S
SCOC**

Environmental Aspect

1. Environmental Management
2. Energy Efficiency and Climate Change
3. Waste
4. Chemical and Hazardous Items

Social Aspect

1. Occupational Health and Safety
2. Emergency Prevention, Preparation and Responsiveness
3. Fair Treatment
4. Labor and Child Labor
5. Freedom to Establish Association, Union and Federation
6. Working Conditions
7. Community Contribution
8. Community Impact

Governance Aspect

1. Compliance with Regulations
2. Corruption and Bribery
3. Rewards and Gifts
4. Conflict of Interests
5. Confidentiality
6. Disclosure of Information

Based on the results of the risk assessment, Thairoil has selected suppliers with high ESG risk levels and critical tier1 suppliers to join the ESG Plus Verification Program. The Program consists of three phases:

01

Verification by Thairoil Group consists of assessing suppliers on a criteria based on “alignment” of supplier conduct with our Procurement Policy; Business and Human Rights Policy for Suppliers; Anti-Corruption Policy; Quality, Security, Safety, Health, Environment, Energy Management, and Corporate Social Responsibility Policy; and Thairoil Supplier Code of Conduct. The main steps of verification include verification through email and onsite verification to ensure that supplier complies with the company's criteria and guidelines.



02

Third party assessment is undertaken for suppliers whose verification results point to high ESG risk levels. Selected suppliers who have been chosen, and are important to Thairoil will be assessed by an external party in order to achieve sustainable development in accordance with Thairoil's code of conduct, and in order to build trust in business partnerships.



03

Capacity building, or capability development, for suppliers. The process began in 2017, and Thairoil has continued to lead this process on an ongoing basis. We present additional recommendations to increase the capacity and enhance the capability of suppliers for each individual supplier. The selected supplier under this development and improvement plan is then considered in accordance to the needs and readiness of the supplier.



In 2019, there were 14 suppliers who have passed the first phase of ESG Plus Verification. The Program will proceed to Phases 2 and 3 as planned.

Number of suppliers participating in the project

Number	18	+12	+14	44
Year	2017	2018	2019	

Process	Indicator	Unit	Performance
High-level Risk Assessment	Suppliers covered by the preliminary risk assessment	Number of suppliers	1,093
		Percentage of all suppliers	100%
	Critical non-tier 1 suppliers covered by the preliminary risk assessment	Number of suppliers	15
		Percentage of all critical non-tier 1 suppliers	100%
	Assessed suppliers identified with high risks	Number of suppliers	17
		Percentage of all suppliers	1.56%
	Assessed critical non-tier 1 suppliers with high risks	Number of suppliers	0
		Percentage of all critical non-tier 1 suppliers	0
Verification by Thaioil Group	High-risk suppliers that have been subject to onsite or through the third party assessment	Number of suppliers	8
		Percentage of all high-risk suppliers	47.05%
	Suppliers identified with non-compliance with SCOC through the third party assessment	Percentage of suppliers covered through the third party assessment	0%
		Suppliers with non-compliance with SCOC that have been assigned corrective action plans	Percentage of suppliers with non-compliance with SCOC
Capacity Building	Suppliers with corrective action plans that have improved performance within 12 months	Percentage of suppliers assigned with corrective action plans	0%

Other than directly providing recommendations to suppliers who have high risk levels and/or non-compliance with the SCOC, Thaioil also gives opportunities for suppliers to join other activities to promote capability and capacity in managing ESG performance, such as:

Inviting 32 key suppliers that have expressed interest through the annual supplier survey to listen to the SME Executive Briefing in the CAC SME Certification Project;



Inviting five key suppliers to join the PTT Group CG Day with PTT Group;

Communicating CSR in Supply Chain through our website, which includes our rules, policies and requirements related to the 7 main topic of corporate social responsibility - i.e. corporate governance, human rights, labour practices, environment, ethical conduct, consumer, and community engagement and development;



Communicating Thaioil's corporate vision, procurement principles, construction plans, supplier evaluation and awards giving, Supplier Code of Conduct relating to ESG aspects, commitment to human rights from suppliers, and corporate governance, through the annual supplier conference, in which the theme for this year is "Partner for Life";



Organizing meetings between contractors and Thaioil Group's executives to emphasize on the importance of safety in the workplace and prepare for the readiness of major turnaround to ensure that tasks can be allocated as planned;



Reviewing supplier evaluation results, which reflected supplier performance in meeting Thaioil's expectations - with work quality, occupational health and safety, and timeliness of product/service delivery - and handed certificates and plaques of honour to contractor companies who successfully fulfilled their duties during the 2019's major turnaround; and



Communicating through supplier relationship building activities to ensure that suppliers are aware of, understand, and follow Thaioil's commitment regarding transparency in procurement processes, such as the No Gift Policy.

3. Overall Monitoring and Performance Evaluation

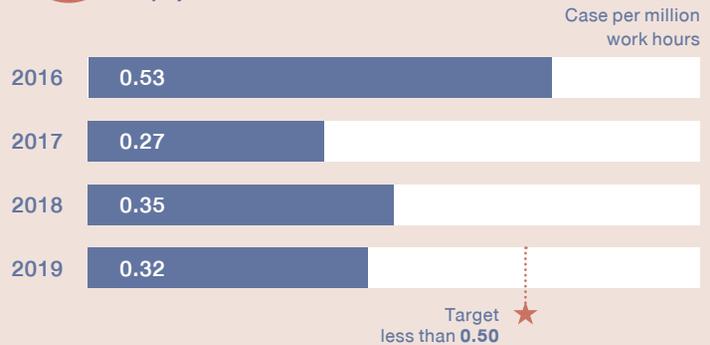
Thaioil monitors the ESG performance of all suppliers, which is guided by indicators measuring our ability to assess the ESG risks of procured product and service groups. In 2019, we have analyzed and assessed the ESG risks of each product and service group, and have also developed our supplier risk management system, which came into effect at the end of 2019. Furthermore, we have continued to develop systems to assess supplier risks in the procurement process on an on-going basis.

In addition, Thaioil has indicators measuring supplier social and environmental performance. For social performance, we monitor total recordable work-related injury rate (TRIR) for contractors, while for environmental performance, we monitor the ocean loss index – an indicator that measures crude oil loss during marine transportation and reflects efficiency in marine transportation. In 2019, our targets were fulfilled. Thaioil has also established a working group to monitor and analyze the causes of oil loss during marine transportation for each trip, and is continuously making improvements to maintain oil loss index below target levels.



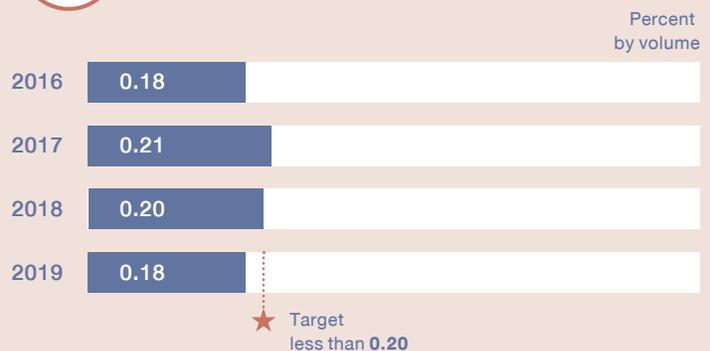
Human Capital

Total recordable work-related injury rate for contractors



Natural Capital

Ocean Loss Index



Promoting Green Procurement

Thaioil conducts procurement with consideration towards environmental impacts. For our purchase of catalysts to replace expired catalysts in the past year – a transaction equivalent to 1,000 billion THB in value – we ensured that catalyst attributes relating to the environment were accounted for throughout the process, including aspects such as energy and resource consumption. We also considered catalyst life cycle management, as evidenced through sending the expired metal catalysts for metal reclamation, in effect generating 300 million THB in value, and reusing metals or useful metals to add value to the business and reduce dependence on natural resources. We also have plans to continue exporting in 2020. Furthermore, we have completed a 2 million THB purchase of non-asbestos gaskets to use as a substitute to reduce impacts on the environment and on the health of our employees and communities surrounding the refinery.

For procurement of materials, equipment, and office supplies, we consider purchases of green products to drive suppliers to develop production processes that create environmentally friendly products and avoid adverse environmental impacts in the supply chain. The share of spending in this product group have increased to 25% since 2018.



Supplier Engagement and Satisfaction

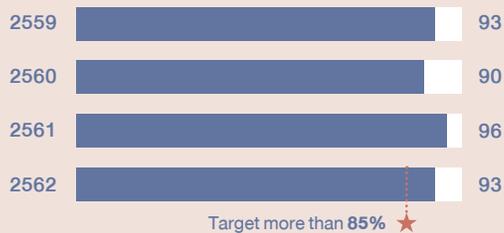
Thaioil takes the necessary actions to ensure that procurement processes are transparent and clear to suppliers. In the tendering process, suppliers submitting tenders can use the proposal tracking system to check progress. This supports clarity and transparency within the procurement process for suppliers. Additionally, we have developed the Thai Oil Group Tendering System (TOP TEN) to support the procurement team in ensuring that the tendering process is aligned with corporate rules and practices. Furthermore, we use e-Auction, an online auction system, to give suppliers the opportunity to compete and bid more than once, resulting in Thaioil being able to procure goods and services at an appropriate price and securing fairness to all involved parties. We have also developed price submission through the PO online system, and applied the E-Catalog system in order to reduce the number of steps in procurement processes, and resource and energy consumption.

Moreover, in order to ensure that Thaioil is aware of the needs of our suppliers, Thaioil has continued to engage, communicate, and listen to supplier opinions on different issues. We collect such information through surveying supplier perspectives towards Thaioil Group regarding procurement management, service quality, and transparency and fairness. Feedback and opinions collected are then integrated to the company's decision-making and management process. In 2019, Thaioil conducted a survey on the perspectives and opinions of suppliers through the support of a company with expertise in research. The Findings from the survey on suppliers' views towards working with Thaioil are presented as follows:

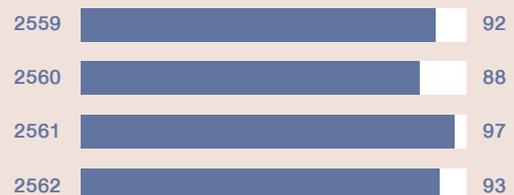


Social and Relationship Capital

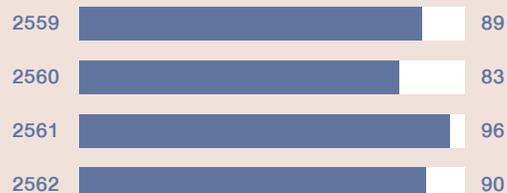
Overall satisfaction with Thaioil



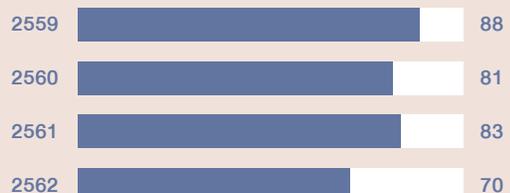
Overall image with Thaioil



Satisfaction with transparency and fairness



Satisfaction with pricing and procurement policy





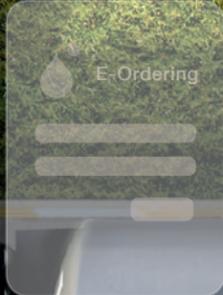
Corporate Social Responsibility



Human and Organization Development



Innovation and Customer Stewardship



Sustainable Value Creation

Sustainable Value Creation in the long term is a way to establish a strong foundation for the business, and is an important step for Thailoil to evolve into our new business model in the future. This entails human capital development and organizational knowledge management that fosters a culture of knowledge exchange, development of innovation, research and development efforts that are diverse and support business growth by leaps and bounds, including the creation of strong collaborations and partnerships. This section of the report, therefore, includes material matters that allow Thailoil to increase the capacity for sustainable value creation.



Important strategies



Financial Capital

Creating income from the efficient resource management of the organization's 6 capitals.

2,174 million THB generated from applying knowledge to improve the business



Human Capital

Creating excellence through the management of human resources and work productivity in order to be a high performance organization.

278 hours of training and development per employee per year



Intellectual Capital

Creating an organizational knowledge management system and utilizing technology within the organization in order to generate revenues and lower production costs.

381 organizational knowledge exchanged and applied



Social and Relationship Capital

Creating business partnerships for long-term mutual growth.

90% employee engagement

96% customer engagement

93.32% community engagement



Natural Capital

Creating new business opportunities to respond to changes in consumer behavior and markets.

842,699 tons of carbon dioxide equivalent reduced through avoided emission products (i.e. gasohol and biodiesel) consumed by end users.

Innovation and Customer Stewardship

Challenges, Risks and Impacts

It is evident that global changes in the modern era are occurring at a higher speed than in the past, and businesses must adapt to respond to a variety of changing factors. One of these deals with the changing pattern of consumer behavior. Business success is thus dependent upon companies' capability and speed in responding to consumer demand.

"Innovation" is one of the key factors that enables corporate sustainability. Mastering innovation to better meet customer demand in a more convenient and timely manner, along with increasing the efficiency and achieving cost savings in the production process, has always been a challenge to the business. To that end, Thaipol not only seeks for innovation and technology to use in the organization for the utmost benefits, but also encourages employees to discover new innovations and apply in the workplace.

Commitment

In 2019, Thaipol took concrete steps to cultivate a culture of innovation within Thaipol Group. We have organized an innovation contest to promote creative and innovative thinking in all employees. The contest attracted more contestants this year than the previous year, and demonstrated that our people placed more emphasis on innovation than ever before. Upon the conclusion of the competition, the innovation function provided the necessary resources and support to help employees in developing their thoughts and ideas into tangible actions – e.g. prototyping, product development, etc. The innovation function also takes actions to instill a spirit of innovation in employees through inviting nationally recognized keynote speakers or experts to share their knowledge and experience, and ultimately stimulating creative thinking that leads to more innovations.

Furthermore, Thaipol has begun sharing our innovative products with other companies and showcasing them at various exhibitions. This allows Thaipol to engage with customers outside of the organization, understand their problems, develop products that can successfully respond to their needs, and gain increased customer satisfaction with our service.

For 2020, Thaipol has plans to continue cultivating a spirit of innovation within our people, and to develop in partnership with other innovators. We will provide the necessary resources to realize our plans – be that knowledge from external experts, researchers, or funding. Our ambition is to drive innovation for the new product development that will respond to the needs of people both in and out of our organization, and potentially bring-in new businesses in the future.

Additionally, Thaipol is conducting a feasibility study in establishing a venture building team to reinforce and promote more concrete innovation within the organization.

Management Approach and Performance



Innovative Culture

Thaioil encourages employees to participate in driving organizational readiness for business transformation, including improving and developing production processes, creating new products, and maintaining good customer relationships through innovation management. To that end, Thaioil Group remains driven to continuously cultivate and promote an innovative culture to develop our people, create an ecosystem that supports innovation development, as well as establish the process of developing various innovations. Most importantly, we prioritize the commercialization and practical application of innovations, and have identified revenues from the commercialization of innovation as one of our key performance indicators.

★ Performance



Human Capital

328

employees participated in activities related to innovation

195

employees participated in the innovation contest, an increase of 62.5% from 120 employees who participated in 2018



Intellectual Capital

96

innovation projects showcased

an increase of

152%

from 38 projects showcased in 2018



Financial Capital

3.1 million THB

worth of benefits from the commercialization of innovation

1,025 million THB

worth of benefits from the 96 projects submitted in the Wisdom and Innovation Award 2019 competition (Benefits comprise of 843 million THB worth of benefits from reducing commercial loss and production costs, and 182 million THB worth of benefits from reducing safety risks)

Commercial benefits gained from innovations in 2019 include:

2 industrial design patents



Control valve tool for K-2 valves (Type 1)

An equipment that assists in the opening and closing of large gate valves with planetary gearboxes, henceforth improving productivity through reducing the number of workers needed and time required to open and close the valves.



IQ3 Motor Operated Valve (MOV) Cover

The IQ3 motor operated valve (MOV) cover is a tool that helps to extend the durability of the equipment by protecting the LCD display screen and the circuit board of the valve from sun exposure. In comparison to the IQ1 and IQ2 MOV cover models, the IQ3 model has an additional special feature – a light indicator that indicates open or closed status on the exterior of the valve.

In 2019, Thaioil Group provided the opportunities for employees to attend various activities that supported the 3E + E strategy as follows

Tools to promote innovative culture according to 3E+E



Educate
 We educate employees by regularly sharing interesting information on technology and innovation through various communication platforms and activities, and creating new experiences and fostering an environment that stimulates thoughts and ideas for innovation for employees within the organization.



Innovation Talk: “How does one prepare for the AI?” by Dr. Warodom Khamphanchai (Bangkok AI Ambassador)

26 March 2019, Thaioil Refinery



Innovation Talk: “How can we survive in the age of disruption?” by Rawit Hanutsaha, CEO of Srichand United Dispensary Company Limited

14 November 2019, Thaioil Refinery



Innovation Talk: “How does big data help us work?” by Dr. Asama Kulvanitchaiyanunt, a leading data science expert in Thailand

28 November 2019, Thaioil Refinery

Execute
 We transform creative ideas into tangible business initiatives through the Idea to Commercialization (I2C) process, through provided funding to support a prototype development into innovation for the company.



Cyclopentane 80 (CP80)

CP80 is a collaborative project within Thaioil Group to produce CP80, which acts as a blowing agent in the production of rigid polyurethane (PU). The CP80 is comparable to the CP95, but with a lower price point and substitute imports from foreign countries. Additionally, CP80 may be used as a replacement of CFCs (chlorofluorocarbons) and HCFCs (Hydrochlorofluorocarbons), which are both main contributors to the greenhouse effect.



K2-Device

The K-2 Device is an equipment that helps open and close large gate valves that have planetary gearboxes. It increases the efficiency of the work process through reducing the number of workers needed to operate the valve by 2-10 times, and reducing the amount of time required to open and close the valves.

The K-2 device is a product that was developed specifically to respond to customer needs. We have distributed the product to PTT Tank Terminal Company Limited in 2018 and PTT Global Chemical Public Company Limited Branch 3: Olefin 2 Plant in 2019.



MOV Cover (IQ2 and IQ3 models)

The MOV Cover is the cover for the motor operated valve, and helps to extend the durability of the LCD display screen and the circuit board of the valve, as its fiber glass composition helps protect the LCD display screen and circuit board from sun damage. In 2019, we have distributed the IQ2 and IQ3 models of the MOV cover to PTT LNG Company Limited.



Exhibit

We showcase innovative products in various exhibitions in Thailand and abroad for publicity and commercial benefits.



National Science and Technology Development Agency (NSTDA) Annual Conference 2019 (NAC 2019)

25-28 March 2019,
Thailand Science Park, Pathum Thani



Pump and Valves Asia 2019

5-8 June 2019,
BITEC Bang Na



The 8th PTT Group Process Design and Simulation 2019

5 July 2019,
Grand Centre Point Pattaya, Chonburi



PTT 40th Anniversary 2019

12-13 July 2019,
BITEC Bang Na



20 Years Energy for Industry Towards A Sustainable Future

9 August 2019,
Centara Grand at Central Plaza Ladprao



4th Process Safety 4.0 Management Conference

21-23 November 2019,
Classic Kameo Hotel, Rayong



PTT WE CAN

29 October – 29 November 2019,
PTT Head Office, Bangkok



Youth Greenovation Awards 2019

23 November 2019,
Chaloem Rajakumari 60 Building at Chulalongkorn University



Shell & PTES Innovation Conference

2-3 December 2019,
Amari Hotel Pattaya, Chonburi



Evaluate

We evaluate outcomes of innovation development in two aspects – the cost savings resulting from the benefits of applying the innovation in the work process, and the revenues generated from the commercialization of the innovation.



Process Innovation

Precise Loading Arm Connection Enhancement (PLACE)

The Precise Loading Arm Connection Enhancement (PLACE) initiative was designed to reduce incidents of oil tank car drivers connecting loading arms to the wrong hole. Such errors lead to oil leakage, and loss of time and workforce required to solve the problem. Furthermore, they may lead to safety impacts in receiving products from oil trucks, such as tank overflow leading to fires at the oil distribution center. Thus, the team has moved towards using artificial intelligence (AI) and machine learning to inspect for the accuracy of loading arms during the product dispensation process. The initiative has helped to increase safety in product distribution with oil trucks, and contributed to increased confidence of our workers and customers involved in the product distribution process. Overall, PLACE created 182 million THB worth of benefits from reducing safety risks.

In line with our business strategy to Strengthen the Core, Thairoil is committed to use research and development to improve the efficiency of production processes in the oil refinery. The main projects organized in 2019 include:

Enterprise Letter of Guarantee on Blockchain

The use of enterprise letter of guarantee with blockchain technology was started from a collaboration with the Thailand Blockchain Community Initiative, wherein participating banks are connected on the same platform through cloud technology. The system covers requesting, renewing, and submission of the enterprise letter of guarantee, and delivers the letter of guarantee directly and immediately to the recipient (Thairoil). This initiative markedly increases the convenience of sending and receiving letter of guarantee, reduces use of paper documents, protects against document counterfeiting, and is updated in real time. It is convenient and fast, it helps reduce cost, limit repetitive work, and increase business opportunities. Overall, this initiative generated 118 million THB worth of benefits from reducing loss and costs.

Thairoil Smart Biz

Thairoil Smart Biz is an online web application designed to solve problems and develop the current working process. It acts as a central platform that connects the database (SAP), the banking system, customers, and Thairoil officers. The system is accurate, precise, comprehensive, and in real-time. Beyond being a payment channel for customers of Thairoil Group, the system holds information related to invoice tracking and transaction history, and sends alerts at each step of the process. It allows for post-audits and creates various summary reports covering statistics and credit limits in which customers can request and check by themselves. Most importantly, the application uses a single sign on system that supports double approval while maintaining the working rights of the approver and the maker. Additionally, the application can be used on mobile phones. This is fitting for the modern age of working and supports convenience, speed, and efficiency in working. Overall, this initiative generated 252 million THB worth of benefits from reducing loss and costs.

Odyssey Project (Digital Transformation)

Thairoil's Digital Master Plan for 2019-2021 consists of three main strategies, including:

Digital Initiatives Execution : Apply digital technologies to increase product value, reduce production costs, and boost work efficiency for employees. In selecting digital initiatives to execute, the projects are categorized and selected based on the length of execution time. The selected projects then become a prototype model for other projects for further implementation, before scaling up in order to ensure sustainable outcomes.

Technology Enablement: Support new digital projects and establish an office system that is responsive to the future of work.

Digital Mindset & Culture: Organize supporting activities to drive organizational change, including stimulating ideas, initiatives, and new innovations.

Based on our 2019 strategy, Thaioil has focused on digital projects that can be executed immediately and observed for results. Examples of such projects include the development of a dashboard to monitor and support the management of the Clean Fuel Project (CFP Support Center), the application of blockchain technology to manage bank guarantees, the modifications made to vendor invoice management, as well as the feasibility studies conducted for complex projects to identify findings for application in business – e.g. price forecasting.

As for projects relating to digital infrastructure, Thaioil has initiated a project on our cybersecurity system and preparation to ensure regulatory readiness for the Cybersecurity Act and the Personal Data Protection Act.

In regard to cultivating mindsets and changing the nature of work, Thaioil has initiated a project to develop a system that allows for increased usage on mobile phones. This will in turn change the nature of employee behavior in the workplace, and allowing them to apply it as a concept that can be extended and applied to different aspects of work.



Product Innovation

Thaioil Group gives importance to product research and development that meets the demands of our customers, including customers from both the energy and chemical groups. We especially value environmentally friendly products and low carbon products. Our target is to maintain the share of sales revenues from green products at no less than 25% of Thaioil Group's total sales revenues.

In 2019, Thaioil Group had 11 green product groups, including:

Green Product Type	Thaioil Group Product Name	Sales Value (Million THB)	Sales Volume
Products that use plants or agricultural outputs in replacement of petroleum (Bio-based Product)	Ethanol from cassava	4,198	191 Million Liters
Products that reduce emissions released to the environment (Emission Reduction)	Rubber oils (TDAE, TRAE, AROS) with PCA content lower than international standards – thus non-carcinogenic and does not cause gene mutation in humans	2,627	102,811 Million Tons
Biodegradable Products	Linear Alkyl Benzene (LAB)	5,086	136,267 Tons
	Heavy Alkyl Benzene (HAB)	62	2,404 Tons
Compostable Products	Cleaning products (KEEEN)	0.5	2.5 Million Tons
Products that reduce emissions released to the environment (Emission Reduction)	Benzene-free solvents	84.77	2,650 Million Tons
	Solvents with low polycyclic aromatic hydrocarbon chemical compounds	48.4	1,040 Million Tons
Products with lower greenhouse gas emissions than products of the same group in the market (Avoided GHG emission product)	Cyclopentane CP80, which can replace use of CFCs and HCFCs	2.5	59 Million Tons
	Gasohol	31,956	1,429 Million litres
	Biodiesel	77,541	3,954 Million litres



Financial Capital

Revenue share of green products out of total sales revenues
Percentage by THB



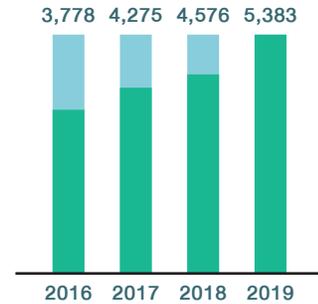
Financial Capital

Revenue share of avoided emission products out of total sales revenues
Percentage by THB



Natural Capital

Avoided emission products sales volume
Million litres



Thaioil started distributing B20 diesel fuels for use by delivery trucks and public buses since 2018. Our product helped reduce air pollution and served as a solution to environmental problems resulting from incomplete combustion. At the end of 2019, Thaioil also started distributing B10 diesel, in line with the government policy to increase the content of crude palm oil in biodiesel to support palm oil farmers. The objective is to create a balance of palm oil, in which the government has determined that the B10 diesel will be the standard diesel grade for general diesel cars in Thailand. Meanwhile, the B7 diesel will be the alternative fuel for old cars and European cars, while the B20 diesel will be the alternative fuel for large trucks.

Moreover, Thaioil is in the process of Clean Fuel Project (CFP) construction. With the CFP, we will be able to produce Euro 5 diesel fuels with lower sulfur content at 10 ppm, and convert fuel oils from our production process to the kind of fuels that are higher in value and more environmentally friendly. This will lead to different refined oil blends for Thaioil, which will also respond to the future needs of the market. Additionally, our companies in the petrochemicals group, such as TOP Solvent Company Limited, have expanded business to new markets, including Vietnam, Myanmar, and Indonesia. We have continued to plan to increase the share of specialty products that are environmentally friendly, and promote research and development to support product development in the future.



Performance



Natural Capital

Reduction of greenhouse gas emissions, equivalent to

842,699

tons carbon dioxide through avoided emission products (i.e. gasohol and biodiesel) consumed by end users



CUSTOMER SERVICE

Thaioil and Subsidiaries give importance to working closely with customers, both in terms of cooperating to deliver products according to customer needs and, most importantly, delivering excellent customer service.

For our oil refinery business, Thaioil is aware of the increase in domestic demand of fuel. In 2019, Thaioil supported government policy through starting to distribute B10 diesel fuel for trucks and public buses in December 2019. This has contributed to the reduction of air pollution and environmental problems resulting from incomplete combustion.

To facilitate convenience for our customers and build customer satisfaction, and to help build competitive ability and our capacity to respond to increasing customer demands, Thaioil has improved our product loading management system and process by separating loading docks into docks for trucks receiving the same type of products, and docks for trucks receiving a variety of products. This will increase the speed of the product receiving process. The Precise Loading Arm Connection Enhancement: PLACE) has been developed by applying digitalization to detect and prevent error of product loading arm.

Moreover, Thaioil had improved financial transaction efficiency through development of the Enterprise Letters of Bank Guarantee on Blockchain. This initiative can satisfy customer as it is convenient and fast, limits repetitive work, high security, and increases business opportunities.

For Thaioil Group's petrochemicals business, Thaioil is driven to run our production process, product delivery, and services that are safe for our customers and that are environmentally friendly. We will accomplish this through developing products and services, advancing new innovations, and increasing product and service value to continuously respond to customer demands. We have also managed all processes to reduce risks

and impacts to the environment, as well as ensure that our customers are provided with the necessary information and knowledge to support their decision-making and to guide them in using and maintaining our products safely. We disclose relevant information to our customers without withholding or changing facts. Furthermore, we are also open to thoughts and suggestions in order to use to develop improvement plans and operation plans, as well as to develop products and services that appropriately match the needs of each customer group.

In 2019, Thaioil:

- Remained cautious, and monitored and evaluated heavy metals that have been identified as hazardous by international standards such as ROHS and SVHC;
- Prepared product safety documents in accordance with the Globally Harmonized System;
- Managed transport of dangerous goods in accordance with the UN Recommendations on the Transport of Dangerous Goods (UNRTDG); and
- Promoted customers' awareness and understanding of safe product usage, maintenance, and storage.

Thaioil prioritizes customer satisfaction at the forefront of our business through serving, listening, and responding to

customers promptly and effectively, and increasing convenience for customers in reporting issues and suggestions. Customers are able to report issues and share suggestions to us through Thaioil's website, telephone, and email. Thaioil will notify the progress in resolving the issue to customers within 24 hours. Our Voice of Customer system collects information in a database which can show historical files and request status, and summarize request type. The database is then used to inform the accurate improvement and development of other services.

Thaioil also values meeting clients regularly to listen to comments and exchange perspectives so as to improve and develop future operations, including:

- Meeting customers to build good relations and report on current market situation, both in Thailand and internationally, on a monthly and quarterly basis;
- Organizing customer visits to our refinery, as well as providing information to enhance understanding of the production process and oil distribution by vehicle, ship, and pipeline;
- Organizing activities to develop customer relationships by holding Sports Day, such as a football match; and
- Participating in the Bangkok Marathon Run activity with customers.



The customer engagement survey showed engagement from various operations, resulting in the evaluation of customer engagement with Thaioil Group of 96%, which was better than the set target. We believe this is a result of our customer relations team's ability to respond to customer product demands and deliver timely service as required by customers.

Human and Organization Development

Challenges, Risks, and Impacts

A key internal challenge facing Thailoil Group is the challenge of transforming our business to match our new vision, which aspires towards a business model that extends beyond oil refining to cover energy, chemicals, and other innovations. To confront this challenge, we must determine an appropriate strategy in managing human and organization management to ensure readiness to accomplish the new business strategy. Our people and organization management approach must have the capability and readiness to drive our business towards the determined vision. This especially applies to accelerate human capital development to increase capacity in completing tasks with excellence, and creating readiness for new businesses.

Furthermore, we are currently facing external challenges that require us to change our human and organization management, including:

- Business competition and changes in the global business market resulting in the need to accelerate employee development through upskilling to strengthen existing skills and reskilling to increase new skills, to ensure readiness for changes and new business models in the future;
- Changes in the labour market, wherein the proportion of working age population has decreased while the proportion of gig workers has increased, require the organization to change strategy in attracting talents to the organization;
- Diversity in age and behavior of millennials and Generation Z employees, the next generation of leaders in the organization, means that Thailoil needs to adjust our human resource management strategy in every dimension to ensure that it is appropriate and elevate employee engagement within our organization; and
- Efficient and fast connections allow personnel to work from anywhere at any time, creating innovation in shorter development periods (Learn Fast, Fail Fast), as well as creating a work environment by using 4Cs experience concepts that help personnel Connect, Collaborate, Communicate and Co-operate with each other more easily.

Commitment

Thailoil Group continues to strive to care for and manage our people with the belief in the value of human resources and the ideology that “stability comes with determined people and refined energy creates value (Our Motto: Refining Values)”. We have defined long-term goals to be achieved by 2025, including: become a leading organization in employee productivity management; maintain the ability to retain talents within the organization, with a voluntary resignation rate of no more than 2.6%; and keep the workforce productivity level at 75th percentile in comparison to competitors in the same industry.

Thailoil has set the Human Capital Index (HCI) as a corporate key performance indicator in measuring human and organization management. The index covers competence development, availability of opportunities to perform, and engagement. In 2019, our HCI was 73 points, which is better than the set target of 70. Our aim is to raise the HCI score to 80 points by 2025.

With the aforementioned commitment towards human capital management, Thailoil Group has determined a human and organization management strategy that covers human resource planning, organizational structure design, recruitment, fostering employee engagement, human capital development, as well as improvement of processes and application of technologies in creating a digital ecosystem. These actions support us in developing our people and organization towards efficiency, and strengthening their capabilities in delivering work to meet organizational goals.

Management Approach and Performance

Thaioil Group has revised the long term "human and organisation management" plan, which covers strategic human resource planning, recruitment of quality personnel, capacity development, and fostering employee engagement and retaining talent in the long term, with a focus on instilling corporate culture and the six TOP Core Competencies - leadership, business excellence, commercial excellence, innovation, digitalization, and agility - to support the vision and corporate strategic plans, and develop Thaioil Group towards becoming a high performance and a healthy organization that can grow sustainably. We have implemented the following key plan as follows:

Human Capital and Organization Development Strategy 2020-2030

 <p>Attraction</p>	<p>Thaioil Group has executed workforce productivity improvement through implementation of employee capacity building initiatives for employees of all departments, including technology integration in the work process and consideration of appropriate employment terms, to strengthen competitiveness in overall organizational productivity. Furthermore, we have studied effective organization structure design and strategic human resource planning to support business expansion in accordance with our strategic plan to move beyond oil refining through the Value Chain Enhancement strategy, and prepared human resource and organization management systems in different dimensions to ensure readiness for new businesses to support our Seed the Options strategy. Other than that, we have elevated our proactive recruitment strategy in order to obtain high-quality personnel to support our business direction and future expansion, through initiatives such as applying digital technology in the recruitment process to streamline the process and collaborating with educational institutions to share various technical knowledge in order to prepare students to enter the workforce, as well as creating an organizational image that can attract our target group to join the organization.</p>
 <p>Development</p>	<p>Adjust human capital development strategy through creating integrated learning experiences for employees throughout the duration of their employment period (Hire to Retire) with the AGILE Learning Experience program, which focuses on instilling corporate culture, values, and core competencies to support Thaioil's vision and business expansion. We use a variety of development programs that are modern, diverse, and responsive to the learning needs of each age group (Gen Z, Gen Y, Gen X, Baby Boom), such as digital learning platform and dynamic career management. Additionally, we drive human capital development to foster positive attitudes and mindsets, resilience, and confidence in one's capacity through the Growth Mindset Project. The Project will develop our employees to achieve readiness in supporting organizational transformation and achieving organizational targets with stability.</p>
 <p>Knowledge Management</p>	<p>Promote the continuous collection of knowledge and expertise important to business operation, and collect knowledge from the implementation of the Clean Fuel Project (CFP Knowledge Capture), a large-scale project, to create employee knowledge development and to identify and resolve problems by using stored knowledge to improve future operations. In addition, Thaioil promotes expansion of scope of knowledge management, and is developing a human capital management system that will standardize management in all Thaioil Group companies, to expand our knowledge base and promote learning within Thaioil Group.</p>
 <p>Retention</p>	<p>Enhance the quality of life of our people in all four dimensions (financial, health, social, and mental) through the Well-being @ TOP initiative to create work-life balance and strengthen the relationship between employees and the organization through flexible benefits. We also enhance the level of communications and relationships within the organization through using digital technology to manage data and build relationships to create a sense of belonging in the Thaioil family. Furthermore, we promote physical and mental healthcare for employees through preventive healthcare measures. We use technology to forecast risks of disease and provide recommendations in proper healthcare, as well as organize a mental care project to create awareness and self-care of mental health for our employees through a variety of activities to reduce stress. We also encourage supervisors of all departments to continuously carry out activities to strengthen relationships within the department.</p>
 <p>Culture</p>	<p>Focus on creating an organizational culture and working behavior through employees of all levels. All employees must have a strong foundation of corporate iTOP+ values. We also focus on instilling digitalization and innovation values in our employees to facilitate the application of technology in increasing work efficiency and increase business opportunities through innovation.</p>

Management Approach

ATTRACTION: Strategic Workforce Planning and Talent Attraction

Management Approach

Thaioil Group operates under a framework of strategic workforce planning which aligns with our business direction and strategy to be used efficiently in the recruitment planning process, with a continued emphasis on recruiting high potential personnel with good characteristics to fit the organization, through the four recruitment process types (4B), as follows:

- **Build:** Accept and develop new graduates
- **Buy:** Recruit experienced employees with high potential
- **Borrow:** Borrow employees with fixed-term contracts from affiliate groups
- **Bring-in:** Employ with defined duration

In 2019, Thaioil used the AGILE recruitment strategy to attract interest in our target groups and to increase their confidence in Thaioil Group's ability to secure stable and sustainable growth alongside employees who are talented and happy with their work. Initiatives include:



A

Automation Process Recruitment

G

Global Recruitment

I

Inspiring & Creating Candidates Experience

L

Lean RC Process

E

Employer Branding

Thaioil developed the E-Smart interview program to use in the recruitment process on the Digital Platform to accelerate the recruitment and selection process, which is considered as the starting point for development of the recruitment and selection process to be modern and efficient.

Thaioil expanded the capacity of recruiting and selecting, and hired highly professionals from abroad and Thais with overseas experience to support the increased number of employees in accordance to business needs.

Thaioil formed alliances with educational institutions in order to expand the base of applicant to diverse career target groups, according to business needs and collaborate with educational institutions to develop courses, create experiences through work observation, and internships to nurture the quality of target personnel in various educational institutions and prepare them to work in the organization.

Thaioil improved the recruitment and selection process to be more streamlined for faster and more efficient recruitment and selection process, which is able to respond to business needs in a timely manner.

Thaioil organized activities to publicize the organization image to be stable and modern to meet the new generation of personnel through the Brand Ambassador and Career Day initiatives, in addition to demonstrating the working environment through VRT and AR technology to attract target applicants whose values are consistent with the organization.

Various activities in accordance with our strategy have supported Thaioil Group in attracting employees and upholding our short-term and medium-term business plans and targets.

★ Performance



Human Capital

Application rate (potential candidates) increased by

40%

Reduced lead time of recruitment from

75 days to **60** days



Social and Relationship Capital

Students benefited from

212 scholarships

Ability to recruit

Percentage of total number of vacant positions



Remark: * In 2019, the Company was able to recruit employees to support current business, meeting 100% of the target set, and was able to recruit 48% more employees than in 2018 to support business need for future business expansion.

DEVELOPMENT: Human Capital Development

Management Approach

Based on an evaluation of impacts from external and internal contexts – namely, digitalization, demographic changes, our strategic focus on extending the value chain beyond oil refining, expanding petrochemicals business, and investing in new businesses, and different types of learning by different age group – Thairoil Group has determined a proactive strategy and a framework for learning called AGILE to ensure employee readiness in driving organizational strategy. The AGILE framework is a framework for employee development, starting from

before they join Thairoil Group to retirement. We have applied this framework in developing our employees for two consecutive years now, using the 70-20-10 development principle. The 70-20-10 development principle does not only emphasize training, but also gives value to learning from others and applying knowledge to real work. Additionally, we have applied technology to help employees learn more efficiently. In 2019, we have continued to focus our efforts on learning programs that cover employees of various groups.

VISION : Empower Human Life through Sustainable Energy and Chemicals

MISSION : To enrich stakeholders' well-being and deliver sustainable returns build upon innovation, technology and resilient portfolio with top class management and accountable corporate governance

Strengthen the Core

Value Chain Enhancement

Seed the Options

AGILE Learning Framework to Drive Strategic Objectives



Employment ● ———— Create quality of life through digital experiences ———— ● Retirement



Generation Z

Thaioil uses the Attract & Adapt strategy to support younger generations in attaining readiness before entering into the workforce. The strategy touches on not only our new employees, but also others who may benefit from this resource. In this period, the emphasis is on providing sufficient knowledge, skills, and capabilities for work, including adaptation skills to work with confidence and stability (Strong Start). Our main initiatives in 2019 include:

Scholarship grants given to students in order to expand educational opportunities, with over 200 scholarships granted to undergraduate and graduate students across Thailand in 2019;

Collaboration with educational institutions through the **Thaioil Academy** program to develop courses and provide needed resources and support, such as equipment, speakers, and experts, to develop students with the knowledge and skills needed by industry; and

The **“Check in Our Future”** program, an orientation program for new employees that provides them with basic knowledge about Thaioil, including management systems and corporate values, through activity based learnings to provide new employees with diverse learning experiences.



Generation Y&X

Employees from this generation possess some work experience and may have already progressed towards senior positions. Employee development for members of this demographic includes three main components: Groom them through focusing on strengthening their capabilities to ensure that they can achieve their full potential while completing tasks; Inspire employees through developing talented employees, leaders, and successors towards career growth paths that empower them to become good leaders; and Lifelong Learning, where we encourage employees to learn on their own through online channels, appreciate the connections between different dimensions of their work, and apply these connections to create in their work. In 2019, our main initiatives resulted in 2,634 million THB worth of business benefits, including:

Course	Target Group	Development Approach	Benefits Generated
Idea Challenge (Project that provides digital knowledge)	All employees	Training, instructor-led training, and on the job training	A prototype of the application that solved the specified challenge
Production Planning Course	Employees in the economics and production planning team	Training, studying practices abroad, work experience with experts, and on the job training	Improvements in the LP model that more accurately reflected the actual production process, which allowed Thaioil to plan crude oil purchase and production more efficiently.
Oil and Chemical Spill Course	Employees in the environment team	Training, work experience with experts, and on the job training	Improvements in the database and forecasts of oil movement or chemical spills
Increasing Production Efficiency Course	Employees in the oil refinery operating team	Training combined with on the job training	<p>Improvements in equipment used within the refinery</p> <p>Improvements in process efficiency</p> <p>Reduction in energy consumption and emission released into the environment</p>

Furthermore, Thaioil Group has developed the Dynamic Career Project, a project that develops employees with talent through focusing on developing experiences along the career path and encouraging employees to develop knowledge, skills, and abilities through on the job learning - whether that be special project assignments or assignments to work with other companies - to support business development. At the same time, Thaioil develops leadership skills in our employees to allow them to progress towards becoming leaders of the future. The Dynamic Career Project also serves as a strategy to retain this group of employees in the long-term. In 2019, a total of 15 employees participated in the Project.

In 2019, Thaioil Group encouraged employees to continuously pursue learning by themselves through purchasing and developing online learning channels. In the past year, 224 employees studied a total of 247 online learning courses through SkillLane, equivalent to approximately 4 hours of learning per person per year. As for our own courses, Thaioil has developed a total of 55 courses, which have been accessed and used by approximately 300 employees.



Gen X & Baby Boom

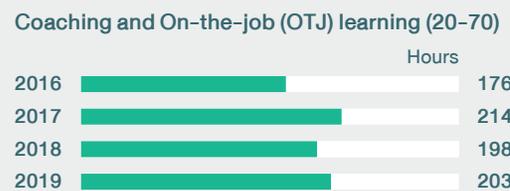
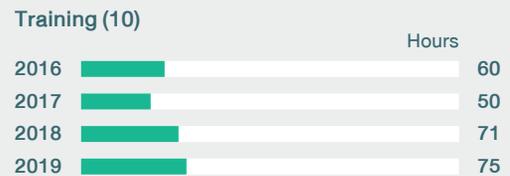
Employees in this demographic group have accumulated valuable experiences within the company for a long period of time. Thaioil Group uses the Exit development strategy, which focuses on knowledge management through knowledge exchange and retention, and transfers of skills and experiences between generations. This is to ensure that our competitive advantage is maintained and sustainability is achieved. To support this strategy, we had the following initiatives in 2019:

Knowledge management for working groups that are **SME (Subject Matter Experts) and COE (Center of Excellence)**, which include positions that have in-depth knowledge or knowledge and experience that is accumulated only after a long period of time, and are positions that are highly significant to the organization. For the first phase, we have commenced this initiative for groups working in the refinery, by identifying which positions are COE and SME, and establishing development roadmaps and managing information gathered from the knowledge sharing from the expert of that position.

With employee development following the AGILE framework, encouraging employees to pursue learning on their own through online channels, and increased application of knowledge, the number of employee development hours of Thaioil Group increased from 269 hours to 278 hours, with a total of 474 million THB of learning and development costs.



Number of employee development hours categorized by development types per person per year



Average training and development hours per person per year



Proportion of employees who have completed employee development according to individual development plans (IDP Progress)



Employee development expenses



KNOWLEDGE MANAGEMENT

Management Approach

In 2019, Thaioil has continuously driven the collection, sharing, and application of knowledge from the day-to-day work experiences of specialized employees and employees who are nearing retirement. We have also undertaken additional initiatives to collect important knowledge on operating the Clean Fuel Project, which is a large-scale refinery expansion project, and expand our database towards all Thaioil Group companies. We have used a variety of approaches in collecting data, such as online documents, videos, interviews, and summaries, to ensure that accessing, learning, and applying this knowledge is convenient and appropriate for all age groups. Additionally, we have allocated time to share knowledge related to project operations to create a space for efficient collaborative learning and problem solving.

Thaioil has also supported and promoted sustainable knowledge management through establishing a committee and a working committee on knowledge management. The committees are tasked with enhancing our employees' capabilities and to continuously drive knowledge

management following our Knowledge Management plan. The committees are also responsible for enhancing knowledge management through integrating knowledge management into day-to-day activities, in order to ensure that knowledge management is convenient for employees and is implemented in the same direction with business direction.

Additionally, Thaioil has promoted the organization of KM Workshops for the knowledge management committee, the committee consisting of function representatives charged with promoting knowledge management in each function. Through these workshops, the function representatives in the knowledge management committee will be trained on knowledge, approaches, and methods in managing knowledge and promoting knowledge management. They will be able to support employees in managing knowledge, efficiently transferring knowledge from one generation to the other, and organize knowledge management plans for each function to be responsive towards the needs and learning approach of each function.

Based on the aforementioned initiatives, Thaioil has expanded our knowledge database to three companies within Thaioil Group; namely, TOP Solvent Company Limited, Thaioil Marine Company Limited, and Sakchaisit Company Limited, to support expansion in our chemicals business in the future. There are also 31 representatives from other functions that have joined the committee for knowledge management, and they have helped support and drive employees in their functions in competing with their knowledge, a total of 381, through Thaioil Wisdom and Innovation Award event in 2019. Benefits created were valued at 2,174 million THB. That said, the Thaioil Wisdom and Innovation Award in 2019 has expanded type of knowledge accepted for the contest to include knowledge related to prototypes and ideas, to promote innovation and application of knowledge in the future.

☆ Performance



Intellectual Capital

381

knowledge created
that increased business benefits,
equivalent to

2,174

 million THB

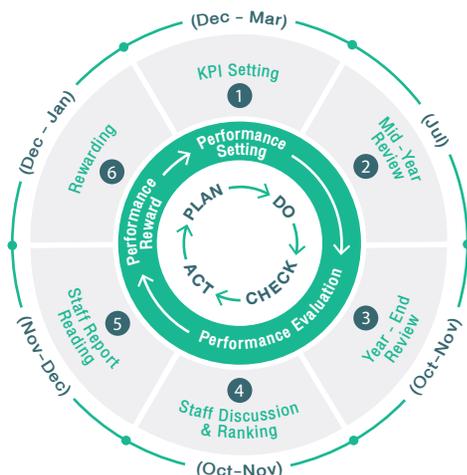

RETENTION & CULTURE: Employee Retention

Management Approach

Thaioil Group gives importance to the opinions of employees through various channels - CEO Connect, a quarterly event where our CEO meets and chats with employees and supervisors; regular conversations between supervisors and employees; and the annual employee engagement survey, where results are used to complete an in-depth analysis to guide us in implementing both individual and collective initiatives projects to care for our people. We undertake these initiatives as a way to continuously improve upon our human and organization management, and promote employee satisfaction and engagement from the first day of employment to retirement. Initiatives are developed to suit the diversity in each generation.

Based on evaluating survey results and recommendations given by employees in the 2018 annual employee engagement survey, Thaioil conducted the following activities in 2019 to increase employee satisfaction and engagement:

With regards to our performance management system, we review and develop tools in evaluating employee performance to ensure that there is clarity and transparency. We also promote communication to create mutual understanding between supervisors and employees. We use the following six steps:



01

KPI Setting: Thaioil Group will determine indicators and targets at the corporate level and cascade these metrics in a waterfall or top down method to the division, function, department, and individual employee levels. Employees can also suggest indicators and targets that align with corporate indicators and targets through the bottom up method. Supervisors and employees can agree on goals to work towards together in order to create participation and togetherness in accomplishing the same targets.

02

Mid-Year Review: Thaioil Group provides employees with the opportunity to review goals and indicators in the middle of the year, and supports by supervisors through coaching and providing feedback on their performance. If there are any factors that would prevent employees from meeting their goals, their supervisors may suggest a review of the plan, including indicators and goals.

03

Year-End Review: Thaioil Group gives importance to reviewing employee performance by providing advice and feedback in order to ensure employees' progress towards a better performance. This includes reviewing achieved goals to act as a basis in setting the following year's goals. Additionally, employees are given the opportunity to evaluate their own performance with their supervisors according to the goals that both parties have discussed and agreed upon.

04

Staff Discussion & Ranking: Thaioil Group requires a transparent performance evaluation process that is fair towards their employees by allowing employees to evaluate their own performance and supervisors presenting the content at the department meeting. The CEO will be the president and the Executive Vice President (EVP) will be a judge in the department meeting where performance will be based on tangible results, and is evidence-based.

05

Staff Report Reading: The supervisors will discuss employees' performance with them in regards to achievements and suggestions for creative improvement, as well as provide encouragement and guidelines on how to continue developing themselves in the following year.

06

Rewarding: According to the performance of the organization, and with the approval of the human resources committee, Thaioil Group will raise wages for employees. This acts as an incentive for better performance and to propel employees towards career advancement.

Career Development

Subject matter expert career track that will support and retain specialized experts within the organization was developed. And, create career growth opportunities that are appropriate as well as designing organizational structure that will accommodate growth for the subject matter experts in the future.

Rewards and Recognition

Thaioil Group promotes the retention of quality employees within the organization in the long term. Beyond providing welfare and benefits that are competitive with other leading companies in the industry, we have initiatives to motivate and demonstrate appreciation for employees who have completed a particular number of service years through the long service emblem ceremony for employees who have reached 10, 15, 20, and 40 years of service. During the ceremony, these employees will be awarded with souvenirs and thanked by Thaioil's executive team.

Employee Well-being

Thaioil promotes employee well-being through caring for employees in every dimension of life, including health, financial, social, and mental, to respond to employee needs during this changing era. Our initiatives are listed below.

Promoting Health – includes development of a Well-Being Application to motivate employees in better caring for their health through different activities for health. The application is also a platform where employees can access information related to health, including results of the annual health survey. We also organize annual health check-ups and activities promoting well-being, such as walking and running.

Promoting financial stability – through providing knowledge in financial management for employees in different age groups (Wealth Management Program), including the wealth program for new staff, life planning aged 41–45, how to lead a wealth above 50, and wealth program for pre-retirement.

Promoting social and mental well-being – Social and Mental Well-Being is supported through the application that promotes collaboration within the organization through activities that connect employees with different interests, such as the mindful leader program and a retiring employees club. We also study employee engagement within the organization and organize other engagement activities.

Continuously creating a corporate culture The values on iTOP+ is identified as one of the human and organization management strategies that must be consistently strengthened and driven. Especially in 2019, Thaioil has focused on creating values of innovation and digitalization to ensure that our organization can drive our vision, mission, and growth strategy. We also promote supervisors in all functions to organize activities that are appropriate for the employees of each function in order to foster good relationships and connections of employees towards the function, and therefore the organization.



Enhancing collaboration between employees in the organization through the Idea Challenge initiative

The Company encourages employees to participate in submitting ideas. This program promotes collaboration between employees of different ages in the current working environment. The idea that wins the competition is then developed and applied in the organization through the #PLAY project. We use the digital platform to promote employee creativity, and organize different activities outside work for employees to participate in. Through organizing activities that bring employees with similar interests together, we build employee engagement and good employee relations while also fostering a sense of belonging within the Thaioil family.

Upgrading employee communication efficiency

The appropriate communication channels have been developed for changed employee behavior in the digital age through applying digital technologies in creating new channels of communication that can serve employees with different information at all times, Rhino-Bot, and a two-way communication channel through LINE Official Account: PM4U.

★
Performance



Human Capital



100% of employees received regular performance reviews



90% employee engagement



89% employee satisfaction



1.16% employee voluntary turnover rate

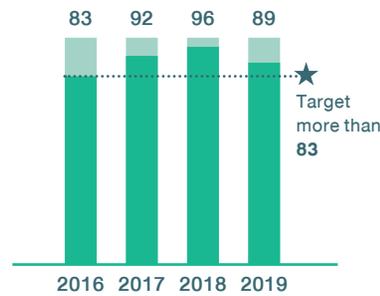
Employees received regular performance reviews



Employee engagement



Employee satisfaction



Voluntary turnover rate



Unit: Percentage

Initiatives undertaken in the past year to manage employee engagement have been extremely successful, as reflected by our performance in employee engagement, satisfaction, and turnover rates, which all achieved set targets.



Corporate Social Responsibility

Challenges, Risks, and Impacts

Thaioil operates business in ways that maintain harmony with communities in all dimensions, including environmental, natural resources, social, and economic aspects. We mitigate any potential impacts that may occur to society and communities in order to maintain good relationships with communities during business expansion.

Management Approach and Performance

Management System

The Board has designated a policy and management approach for corporate social responsibility, as well as continuous performance monitoring. The Company has established a management and dedicated working function to oversee corporate social responsibility activities, including planning strategies, drafting long-term development plans, conducting onsite visits to engage with surrounding communities and remote communities, and reporting performance. Performance will be reported to Corporate Governance Committee quarterly, and communicated to employees to follow systematically.

Corporate Social and Environmental Responsibility Policy

- 01** Strive to develop business's sustainable growth coupled with environmental stewardship and care with due regards to the impact on the community and society as a whole.
- 02** Bring upon knowledge, experience, and expertise in engineering and energy business to support social development with focus on the use of natural resources for utmost benefits under the Sufficiency Economy Philosophy for self-reliance sustainably.
- 03** Implement corporate social responsibility projects by focusing on community's participation in collaboration with local organizations in the public sectors.
- 04** Promote Thaioil Group employees' participation while instill corporate social responsibility values and corporate culture.

Commitment

Thaioil aspires to continue the refining petroleum and petrochemical business despite the backdrop of competitive markets and constant changes. The Company strives to succeed under the framework of operational excellence and principles of good governance. Both serve as a foundation for good and transparent business operation- coupled with our unwavering commitment to stakeholders, the environment, communities, and societies - will facilitate Thaioil towards sustainable development.

In 2019, our community engagement score was 93.32%. The initial target set is for community engagement to reach or exceed 85% by 2020. As an addition to the Thaioil Job Training Community Center program, Thaioil has organized the Course Training Project to train communities with fundamental job skills, including knowledge in conducting business in small and medium-sized enterprises (SME) and establishing a market for community projects.

Corporate Social Responsibility Strategy

- 01** Conduct social activities by focusing on projects that affect the operation of the network of Thailoil.
- 02** Cover the four areas: education, energy and natural resources, conservation of the environment, and quality of life. The strategy is to achieve self-reliance and sustainability.
- 03** Manage networking and collaboration with PTT institutions, and agencies with expertise and are highly respected by society.
- 04** Promote the participation of stakeholders, such as government agencies, customers, suppliers, and employees in the CSR.

In 2019, Thailoil developed a social enterprise strategic plan that supports and develops the country's public health. The plan is under the framework of

Sustainable Energy for Health Care

Thailoil has executed a project to install solar-based electricity generation system for hospitals. This will enhance the hospitals' energy security, elevate their capacity to provide medical treatments for the public, and reduce their financial burden for the aforementioned fees. The installation also decreases greenhouse gas emissions through reducing fossil fuel consumption, and promoting development of Low Carbon Community pilots. Thailoil has made use of our expertise in engineering and energy to innovate for the public health's greater good – relieving them from the financial burden and reducing energy consumption. In 2020, the Company continues to lay out plans with partners to develop innovation in energy for hospitals or public medical centers. With objective of the project to increase the efficiency of electricity system through replacing medical equipment that are more energy - efficient, as well as promotes the shift away from fossil fuel dependence through solar cell system installation. These efforts facilitate environmental responsibility and cost reduction.

Community Needs Assessment and Engagement in Communities Surrounding Operations

Community Needs Assessment Approach

Thailoil Group conducts community relation activities with communities surrounding the refinery according to the 3-synchronization model. This comprises of Thailoil Group, the 10 surrounding communities, and public agencies – namely, Laem Chabang district, Laem Chabang Hospital, and academic institutions. Activities are conducted according to our "5 Together" conceptual framework, which is think together, act together, correct together, learn together, and develop together. This ensures communities are engaged in their own development, and are self-sufficient and able to become a strong community. Activities are categorized into four themes, comprising of social, religion, traditions, and culture; health; education; and environment. Thailoil adheres to the principle of holistic development, and has the following mechanisms to acknowledge community's needs.



3 Synchronization Model: Aside from ensuring that accurate and reliable Company communication to communities, there is also a 'speaking locally' session. This session gives space for each community's representative to present issues or feedback regarding Thailoil's operation, enabling the Company to look into and resolve the issue, and ultimately develop long-term solutions and prevention measures.



Small Group Public Hearing: Through the platforms with smaller mobile units or public discussions, communities eager to request for information or clarification on any projects can do so through the head of community's committee. The head will then inform on-site officers to acknowledge, take actions, and share performance to the community.



Community Engagement Survey: Conducting by an independent, third-party agency. The survey covers community's satisfaction with community relations activities organized by the Company. Survey results are then analyzed and utilized to make further plans for the future. In 2019, community engagement surveys was at 93.32%, which was better than the target of 85%.

Progress of 2019 Project Implementation and 2020 Plan

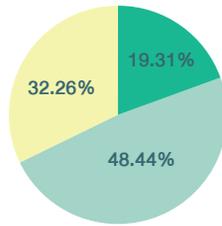
Project Type	Priority	Status	Objectives
CSR Nearby Refinery			
Construction of Thailoil Building for Laem Chabang Hospital in Sriracha, Chonburi	Quality of Life	Commenced operations on 1 st October 2019	To promote public health and quality of life for Sriracha residents.
CONNEX ED Project to develop leadership skills (in collaboration with PTT Group)	Education	In 2019, the "Light for the Better Life" Project was completed for 10 schools. Development initiatives in English and STEM are ongoing and will be continued in 2020.	To develop leaders and quality teachers who can manage STEM education and enhance their developments in English skills, and apply electrical engineering expertise in developing school infrastructure.
(New) Community Job Training Center near Health and Learning Center	Quality of Life	In 2019, a project to increase community incomes was implemented to explore community needs. In 2020, the project will be developed as part of the Community Job Training Center Project.	To strengthen community's capacity through job training for local residents in Sriracha area, and the project has already been implemented via Thailoil's Health and Learning Center.
(New) Crab Bank, Community Fishery Center and Local Marketplace	Environmental Conservation	Conducting feasibility study with communities in the area	To create a balanced coastal resource management system, serving as crab hatchery and conservation, prior to them being released to the sea. This builds sustainability for fishery industry.
Solar Cell Installation for Koh Sichang Hospital	Energy and Natural Resources	Installed a 53.46-KW solar panel system on the hospital rooftop	To promote the use of alternative energy in replacement of electricity generated from the diesel generator, which is unstable.
Baan Khao Yhai Community Forest at Bo Thong with the Royal Forest Department and the Thailand Greenhouse Gas Management Organization (TGO)	Environmental Conservation	Planted 30 trees and built a fire lookout in Baan Khao Yhai Community Forest of 1,238 Rai	To develop green spaces within the 1,283-Rai, reduce greenhouse gas emissions, and create a forest fire lookout that will develop knowledge towards forest conservation and awareness for local communities.
(New) Community Forest Project in Chonburi, in collaboration with the Royal Forest Department and the Thailand Greenhouse Gas Management Organization (TGO)	Environmental Conservation	Conducting onsite feasibility study and MOU	To promote sustainable community forest management, strengthen the capacity of community forests to act as greenhouse gas (carbon) sinks, and enhance communities' quality of life.
(New) Green Space and Communal Space Project for communities around the refinery	Environment and Quality of Life	Conducting feasibility study	To increase green spaces to be used as greenhouse gas (carbon) sinks, provide spaces for community use to exercise and improve their health and well-being, and a center for exchanging local cultures.
(New) Swimming, football, and futsal skill developments for youths around the refinery	Quality of Life	In planning phase	To promote youth health and well-being and to encourage productive use of spare time.
Country Development			
Alternative Energy and Philosophy of Sufficiency Economy (PSE) Education Center at the Baan Huay Tong Border Patrol Police School at Nopphitam District, Nakohn Si Thammarat Province, per Princess Maha Chakri Sirindhorn's initiative	Energy and Natural Resources	Installed a 10-KW hybrid solar system with a 9.6-KW energy storage system	To address issues in the electricity system at the end of transmission lines, which have resulted in frequent blackouts and associated issues in storing fresh ingredients for students' lunch meals, and to expand the electricity transmission to Health Promotion Hospital in Baan Huay Tong, a hospital located nearby. This enables more efficient vaccine and serum storage for the public.

Project Type	Priority	Status	Objectives
Rooftop solar power electricity generation project at Thanyarak Hospital, Mueng District, Mae Hong Sorn Province (Hospital for Recovering Addicts in the Northern Region)	Energy and Natural Resources	Installed a 40-KW solar panel system on the hospital's rooftop.	To enhance energy security for medical services, reduce the hospital's electricity expenses, and to promote development of Low Carbon Community Smart City Project in remote areas.
PTT Group CSR & Social Enterprise Development			
Café Amazon for Chance at Laem Chabang Hospital in Sriracha District, Chonburi Province	Quality of Life	Commenced commercial operations on 9 th July 2019 and hired 3 baristas with hearing disabilities. All baristas were students from Sotachon Suksa School, Bangsaen, Chonburi Province.	To create jobs for those underprivileged, ensuring they have full-time employment, hence elevating their quality of life. The target group is underprivileged individuals in Chonburi areas, such as people with disabilities, elderly, teenage mothers, underserved students, and workforce in the area.
"OUR Khung Bang Kachao" Green Space Development and Conservation Project	Environmental Conservation	Participated in the working team on water resource development and erosion management, and supported the installation of Automatic Telemeter to Monitor Water Situation and Quality Project.	To develop water baseline data and community water management mechanism. The plan comprises of 3 components, which are human capital development through science and technology, detailed mapping of Khung Bang Kachao, and installation of automatic water telemeter.
Employee Voluntary Culture			
"Run For the World" in His Majesty's Honor; run, walk and collect the distance which can be traded for tree plantation	Quality of Life and Environmental Conservation	Ongoing and to be continued in 2020	To foster environmental volunteerism, and promote good health and well-being.
TOP Way of Conduct CSR for subsidiaries in the Group (TS/SAKC/TM)	Quality of Life	Ongoing and to be continued in 2020	To foster volunteerism and elevate the CSR work system.
Charity Bowling to support Thailoil Group's volunteering fund	Quality of Life	Ongoing and to be continued in 2020	To raise funds for Thailoil Group's volunteering fund, which serves to promote employees in proposing CSR activities or projects and to support employees affected by natural disasters.
(New) Promote employees to do community service	Environmental Conservation and Quality of Life	In planning phase	To raise employee awareness of social and environmental responsibility.
CSR Networking & Branding			
2019 Thailoil's 1st Fine Arts Contest	Quality of Life	Ongoing and to be continued in 2020	To promote students' artistic capacity in creating their own arts, and share their works of art to the general public; and allow for exchange of artistic knowledge.
PTT Group Disaster Management	Environmental Conservation and Quality of Life	Ongoing and to be continued in 2020	To create a network, and develop system and human capital in assisting those affected by natural disasters in a broader scale.

Performance

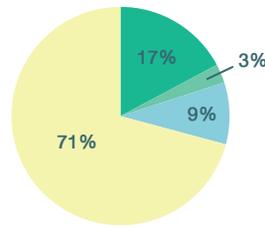
How we contribute
(% of cost incurred)

- Charitable donations
- Commercial initiatives
- Community investment



What we support
(% of cost incurred)

- Promotion of Education
- Community Quality of Life
- Energy & Natural Resource Development
- Environmental Conservation



Input

Cash donations of approximately **65** million THB

Management overheads of approximately **24** million THB

In-kind giving of **2** million THB

Value of volunteering time of approximately **7** million THB

Output

15 CSR activities/projects

Value Creation Framework for Society and Community Development

Priorities	Education (SDG target 4.3)	Environmental Conservation (SDG target 13.1) (SDG target 13.3)	Energy and Natural Resource (SDG target 7a)	Quality of Life (SDG target 3.8) (SDG target 8.3)
Approach	Support initiatives, collaborate with academic institutions, and grant scholarships	Manage operational process and reduce greenhouse gas emissions	<ul style="list-style-type: none"> • Develop alternative energy source • Promote efficient energy consumption 	<ul style="list-style-type: none"> • Support access to employment and promote public health for local communities
2022 Goals	<ul style="list-style-type: none"> • Develop and support teachers and youths alike in various aspects, from general education, English, science, sports, arts, and many more, and generate benefits for more than 5,000 beneficiaries. 	<ul style="list-style-type: none"> • Plant over 200,000 trees • Help reduce greenhouse gas emissions, equivalent to 2,000 ton carbon dioxide 	<ul style="list-style-type: none"> • Install solar systems in over 50 hospitals and medical centers. • Generate over 3,000 kilowatts of solar cell-based energy. • Reduce at least 5 million THB of electricity costs for hospital per month (applicable to all hospitals with the installation). 	<ul style="list-style-type: none"> • Organize over 100 additional job training programs. • Over 500 local beneficiaries participate in job training programs. • Create work opportunities for those with disabilities and underprivileged, and generate benefits for more than 200 beneficiaries.

<p>Priorities</p>	<p>Education (SDG target 4.3)</p> 	<p>Environmental Conservation (SDG target 13.1) (SDG target 13.3)</p> 	<p>Energy and Natural Resource (SDG target 7a)</p> 	<p>Quality of Life (SDG target 3.8) (SDG target 8.3)</p>  
<p>Value Created for Society in 2019</p>	<ul style="list-style-type: none"> A total of 89 teachers and 1,846 students were trained in the-CONNECT ED Project. A total of 60 youths from 10 communities received futsal training from Thairoil Group's youth futsal training. A total of 100 youths from 10 communities participated in Thairoil Group's youth football training. Undergraduate art students, from first year to senior year, participated in a contest whose theme was "The happiness of Thais". A total of 18 awards were given. 	<ul style="list-style-type: none"> Reduced approximately 100 ton carbon dioxide equivalent by 10,000 plantation, from "Forests against Global Warming Project" in honour of His Majesty's and Run for the World. 	<ul style="list-style-type: none"> Installation of solar system at Ko Sihang Hospital, at Sichang District, Chonburi Province. The capacity was approximately 50 kilowatt Installation of rooftop solar system for Thanyarak hospital in Mae Hong Son. The capacity was approximately 40 kilowatt. Installation of a hybrid solar system at Baan Huay Tong Border Patrol Police School at Nopphitam District, Nakohn Si Thammarat Province. The capacity was approximately 10 kilowatt, equipped with a 9.6 KW-energy storage system. 	<ul style="list-style-type: none"> Organized 4 job trainings with over 150 participants from 10 communities <p>The 1st time A training on traditional Thai desserts, making Ja-Mongkut and Jeep Nok</p> <p>The 2nd time A training on traditional Thai desserts, making of Tako and modern twist of Sai-sai</p> <p>The 3rd time A training on traditional Thai desserts, making Kulab-Chan Fa and Tua Pab</p> <p>The 4th time Making dumplings and steamed buns</p> <ul style="list-style-type: none"> 5,894 beneficiaries from "Dental Health Project"
<p>Value Created to Business in 2019</p>	<ul style="list-style-type: none"> Generated a total of 30 million THB of corporate public relation value (PR value) from social development activities. Created corporate volunteering culture in contributing back to society. In 2019, a total of 1,302 Thairoil Group employees volunteered in 15 projects, which was equivalent to a total of 10,416 volunteering hours. Community engagement was at 93.32% The ability to recruit new staff reached up to 100% of total required vacant positions, achieved the plan. 			

Surrounding Community Development Project Highlights

Thaioil Building for Laem Chabang Hospital



Background

Thaioil prioritizes supporting and developing communities around the Company’s refinery. Aspects cover education, public health, religion, cultures and traditions, as well as environmental conservation. Thaioil’s building construction is another project demonstrating its commitment in uplifting the public’s quality of life regarding public health.

Performance

Thaioil building was constructed to serve as a 5-floor accident and emergency treatment building, with over 5,000 square meters of space for usage. The building is designed according to the Ministry of Public Health’s standard. The construction was supervised by a knowledgeable and expert team of Thaioil engineers. Design of the working space was done in collaboration with doctors and nurses of Laem Chabang Hospital. The Thaioil building was designed to serve as a pilot surgery treatment building, aiming to be one of the most modern and hygienic buildings in Chonburi. Thaioil provided 100 million THB of financial support for building construction, and collaborated with the Laem Chabang District and Laem Chabang Hospital in setting up the “Laem Chabang Hospital Accident and Emergency Treatment Building Support Fund”. We supported fundraising efforts that raised over 80 million THB from companies, stores, and the general public. The fund was used to support construction of different operational systems, such as the air conditioning system and the medical gas supply system. The coordinated efforts resulted in the Thaioil building being completed and opened to the public on 1st October 2019. This building increases the hospital’s effectiveness for important and time-sensitive services, such as emergency room, surgery room, delivery room, neonatal intensive care unit, chemical washrooms, and a separated room for those with respiratory diseases. The project reduces overcrowded conditions, leading to lower risks of deaths and disabilities for locals. The hospital is also able to treat more patients, with increased capacity from 165 beds to 250 beds. Furthermore, the project serves as a symbol illustrating collaboration between the public, private, and local governmental agencies to provide treatments for those suffering from illness or accidents.

Objectives

- Elevate the level of medical care for Laem Chabang residents, ensuring accessibility and effectiveness
- Prepare emergency response capacity and ensure readiness to provide medical treatment in the event of accidents
- Mitigate risks of deaths and disabilities
- Mitigate issues of overcrowding in patients awaiting treatment

Corporate public relations value (PR Value)

3.87 million THB

Total volunteering hours

136 hours



Video for the opening ceremony of Laem Chabang Building

Thaioil Group’s Dental Clinic for Schools



Background

Cavities and other oral conditions affect people of all ages, particularly between children of 6-12 years old. This age range is important as they face various changes, physically and socially. Notably, those in this age range would finally have their real set of 28 adult teeth.

Activity

“Dental Health Campaign” for primary school students from Years 1 to 6 in eight schools around the refinery

Objectives

To promote students’ oral health.

Performance

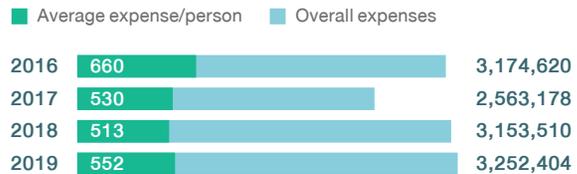
1. Arrange for dental health check-up, from cavity filling, removal, coating over teeth gaps, fluoride treatment, plaque scraping, and other support to prevent cavities. The support has been provided to schools free of charge since 2010. The operation has been consistent up until present. Students' oral health has been improving.
2. The rate of gingivitis was at 15.92 among Year 6 students, 12 years old, across eight schools.
3. The rate of DMFT among students across eight schools is at 1.88

Key Statistics for "Dental Clinic for Schools Project"

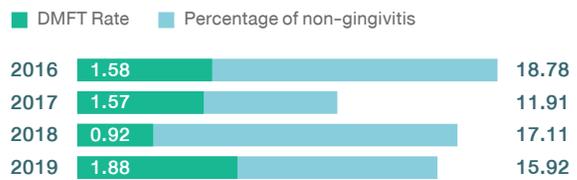
Total numbers of individuals serviced



Total expenses on dental care support



Statistics on dental health of students serviced



Note DMFT and percentage of non-gingivitis are statistic specific to Year 6 students

Laem Chabang Youths to Champion Rope Jumpers Project



Objective

To provide opportunities for youths to exercise and have good health; increase bone mass density and muscle strength for youth; and reduce possibility of heart diseases in the future.

Background

The project commenced in 2012 and has been ongoing. It is organized by the Thailand's Heart Foundation under the Royal Patronage of H.M. the King. The project creates new sportsmen every year, and continues to enhance their skills. And, trainers in each school has received skill training development. The project covers eight schools in Laem Chabang district, comprising of Wat Mai Nern Payom School, Wat Manorum School, Wat Laem Chabang School, Wat Chak Yai Jeen School, and Laem Chabang 1 and 2 schools, Wat Baan Na School, and Boon Jittawittaya School.

Activity

Joint-meeting with directors and health education teachers from eight schools to brainstorm and resolve issues of cavity among students. The issue arises when students have their desserts, but would not brush their teeth afterwards. This also causes obesity among children who do not like to exercises. This results in the response plan to encourage youths' exercise via rope jumping support. It is a budget sport and requires minimal space. It can be played as individuals or as team, and is a productive way to spend their leisure time.

Performance

In 2019, rules were changed per international standards. Players are separated into two levels, which are professional and novice. It was the first year for multiple foreign participants. There were participants from South Korea, Hong Kong, Singapore, Pakistan, and Malaysia. Within Thailand, there were 1,000 participants coming from 40 schools across the country. Youths in Laem Chabang areas were able to win a total of 7 Princess Sirindhorn's Cups, out of a total 24 cups. There are now 2-3 more teachers being in charge per school in the past year, along with training seminars for knowledge-sharing sessions on jumping ropes from science and sports experts.

Project	Date	Participants		Total
		Players	Trainers	
New Sportsmen to Rope Jumping Champion Project	24 Jul19	190	16	206
"Thaioil Group's capacity building for rope jumping teachers across 8 schools"	15 Aug19	-	10	10
Thaioil Jump Rope Test Camp 2019	6-7 Sep19	193	18	211
Competition to Select of Regional Representative	15 Sep19	263	15	278
The 12 th Nation-wide His Majesty's cup	30 Nov19	198	20	218

Graph Demonstrating Numbers of His Majesty's Cups won between 2015 - 2019

Note
No competitions were organized in 2017



Light for a Better Life Project



Background

CONNEXT ED in Pracharath Project

Objective

To bring Thaioil's engineering knowledge, experience, and expertise to help develop schools' capacity to prevent electricity-induced fire. This helps reduce risks from electrocution for students and personnel alike. The equipment was changed to be more energy-efficient, and fundamental advice was given on electrical system and tools' maintenance.

Performance

Volunteering employees from electrical engineering departments from Thaioil Group to monitor, improve, and fix malfunction and unsafe electrical system. They also installed equipment to protect electrical system, anti-electrocution equipment. Similarly, they improved the lighting system within corridors and classrooms, as well as promoting energy-saving practice by installing LED light bulbs. The project covers 10 schools.

Year	School	Beneficiaries		Investment
		Students	Teacher/ Instructor	(THB)
2017	Baan Nong Song Hong School Chonburi	173	14	38,282
2017	Wat Don Sai School, Chacheongsao	135	11	61,756
2018	Wat Prasatsopon School, Chacheongsao	101	7	23,217
2018	Baan Nong Kha School, Chonburi	174	15	162,870
2018	Baan Nong Kayad School, Chonburi	272	16	149,915
2018	Wat Sanamchan School Chacheongsao	217	9	163,960
2018	Wat Laem Chabang School, Chonburi	313	21	172,804
2018	Wat Mai Nern Payom School, Chonburi	612	38	294,815
2019	Wat Manorum School, Chonburi	1,232	63	499,732
2019	Baan Chak Yai Jeen School, Chonburi	614	26	176,578

Corporate public relation values (PR value)

3.04 million THB

Number of volunteering hours

2,000 hours

Annex for Projects/Activities



Solar system installation for Koh Sichang Hospital, Koh Sichang District, Chonburi Province



Objective

To increase electricity stability for Koh Sichang Hospital; help reduce greenhouse gas emissions from reduced fossil fuel consumption; and increase effectiveness of medical treatments for local residents.

Performance

Thaioil, in collaboration with Global Power Energy Synergy (Plc) "GPSC", installed a 53.46-KW solar system on Koh Sichang Hospital's rooftop. The budget was approximately 1,750,000 THB. Each company's electrical engineers participated in onsite surveys, work monitoring, both during and after the installation. The project launched and starts generating electricity in November 2019, and has a social return on investment (SROI) value of 113.8% or 1.138 units.

Electricity generated

12,110 kilowatt-hours

Equivalent to

9,010 kilograms carbon dioxide reduction

Cost saving

38,111 Baht

Background

Koh Sichang Hospital is facing issues with electricity stability. This is because underwater wires are torn from ships' anchoring. The Provincial Electricity Authority (PEA) has solved this issue by installing five diesel electricity generators to provide electricity for residents and Koh Sichang Hospital.

Corporate public relation values (PR value)

1.56 million THB

Number of volunteering hours

272 hours

2019 Nation-wide Community Development Project Highlights

Solar system installation at Baan Huay Tong Border Patrol Police School at Nopphitam District, Nakohn Si Thammarat Province



Background

Thaioil implemented an alternative energy development project as per Princess Sirindhorn's initiative. The project aims to address electricity instability at border patrol police learning centers in remote areas across Thailand.

Objective

To resolve frequent blackouts at border police's learning center, which is at the end of the line. The project achieves this by installing a solar system, which increases the effectiveness of distance learning, of preserving food ingredients for students' lunch, and to increase effectiveness in medicine, vaccine and serum storage for communities. Thaioil's knowledge in engineering and energy was utilized to help develop alternative energy in remote areas.

Performance

Installed a 10-KW hybrid solar system, in addition to a 9.6-KW energy storage system. The budget was approximately 1,000,000 THB. The electricity cable has been connected to hospital in Baan Huay Tong Sub-district, locating nearby. This means the hospital is now able to store vaccine and serum, in turn able to benefit the public more effectively. There is also a knowledge-sharing session on alternative energy and solar system for border police officers at Baan Huay Tong, ensuring they can use and maintain the system self-sufficiently.

Corporate public relation values (PR value)

1.97 million THB

Rooftop solar system installation for Tanyarak Hospital in Mae Hong Sorn



Background

Thaioil and Global Power Energy Public Company Limited collaborated to support installation of a 40-KW rooftop solar system at Thanyarak Hospital. The cost was approximately 1,800,000 THB. Both companies divided their support in half. As for additional miscellaneous costs incurred, the hospital can seek support from the funds. The project aims to promote energy conservation, part of Mae Hong Sorn Development Program. The program also aims to build Mae Hong Sorn as a pilot energy smart city, through collaboration with the Energy for Environment Foundation.

Objective

To enhance electricity stability for medical services and drug rehab treatment; reduce the financial burden of electricity fees for a hospital; and promote the concept development towards energy smart city, "Low Carbon Community".

Hospital's Development Plan and Management

The hospital will utilize the money saved from avoided costs to fund rehabilitation of addicts, job training for recovered patients, and publicizing the project to serve as a model for promoting and expanding solar rooftop installation in Mae Hong Sorn province and other regions.

Performance

Installed a 40-KW rooftop solar system. The project is completed and is in-between testing. The launch will be in the 1st quarter of 2020.

Corporate public relation values (PR value) **0.83** million THB

2019 Social Enterprise and Community Projects with PTT Group Highlights

Thaioil Haven for Community at Laem Chabang Hospital, Sriracha District, Chonburi Province



Background

Thaioil has organized a rental space for Social Enterprise (SE) business. For phase 1, Thaioil has co-invested in a Cafe Amazon for Chance branch at Laem Chabang Hospital. The Company has also built more green spaces for Laem Chabang Hospital's usage.

Objective

To create jobs for underprivileged individuals, allowing them to have full-time jobs, income and elevated quality of life. The focus group is those underserved in Chonburi, such as disabled people, elders, teenage mothers, underprivileged students, and local workforce in the area.

Performance

Cafe'Amazon for Chance commenced commercial operations on 9th July 2019. The cafe hired 3 baristas with hearing disabilities. All baristas were students from Sotachon Suksa School, Bangsaen, Chonburi. It is now conducting a new approach for social enterprises, and will hold an official opening ceremony in the 2nd quarter of 2020.

OUR Khung Bang Kachao



Background

Thaioil joins in as a working committee on 'Water Resource Development and Erosion Management'

Objective

To promote balance between conservation and development; reduce likelihood of disasters; create stability and sustainability for water resource; build a prototype for water resource and improve water storage system and water distribution system, ensuring it is suitable to the area; create a more efficient water management system and conservation; and ensure public engagement in Bang Kachao's water management.

Performance

Thaioil collaborated and supported by providing the Company's volunteering engineers to work with the Utokapat Foundation Under Royal Patronage of H.M. the King and the Hydro-informatics Institute. The two have been partners in sustainable water management structure and in researching technologies for water management and erosion prevention innovation. The aim is to achieve maximum efficiency in management. Thaioil also provided financial support in installation of automatic water telemeter to monitor water level and water quality.

2019 Volunteer Culture Development Project Highlights

"Community Forests Against Global Warming" in His Majesty's Honor



Background

Thaioil supports the government sector and the public, collaborating with the Royal Forest Department, Thailand Greenhouse Gas Organization, and Baan Khao Yhai Community, to launch the project "Community Forests Against Global Warming." The project is at Baan Khao Yhai, Moo 4, Pluang Thong Sub-district, Bo Thong District, Chonburi Province.

Objective

To support communities in managing community forests sustainably and increase the forest's capacity in reducing greenhouse gas emissions.

Performance

Planted over 6,000 trees, and recycled raw materials from refinery (iron) to build a forest fire lookout. There is also an assessment to determine greenhouse gas storage capacity of community forests, which span across 1,283 Rai. Amount of greenhouse gas emission reduction is equivalent to 76,629.153 ton carbon dioxide.

Corporate public relation values (PR value)

3.25 million THB

Number of volunteering hours

1,008 hours

“Run for the World” In His Majesty’s Honor



Objective

To promote employees to have greater health and even better community mindset, by engaging them to restore and revitalize the forests.

Background

Thaioil group prioritizes employees’ health and volunteerism. The Company has therefore organized a project for employees to walk and run, and collect the mileage to exchange and contribute for the number of trees planted (5 Kilometers: 1 Tree)

Performance

There were 258 employees who walked and ran, and collected a total of 11,788 kilometers. Employees were then invited to join in tree planting with Baan Khao Yhai community, Pluang Thong Sub-district, Bo Thong District, Chonburi Province. The plantation area was 20 Rai (or 4,000 trees). Furthermore, there were also other environmental conservation activities, which include building mineral dirt puddle and weir.

Number of
volunteering hours **1,736** hours

TOP Way of Conduct



Background

The TOP Way of Conduct serves as the key policy for corporate management as a conglomerate. The CSR policy is one of the policies that drives subsidiaries to perform in alignment.

Objective

To create a community service culture and elevate community works; to create CSR policy, annual community development activities; and to build a community development network with stakeholders.

Performance

Corporate public relation
values (PR value)

1.00
million THB

Number of volunteering hours
3,280 hours



Charity Bowling Supporting Thairoil Group's Funds for Volunteering



Number of volunteering hours

1,984 hours

Background

The fund for Thairoil Group' volunteering activities supports employees' implementation of community projects. It also aids employees suffering from natural disasters. Through the period of 8 years (2012-2019), there were 100 employee-led CSR projects. This resulted in the fund becoming insufficient for further community development projects.

Objective

Organize "Charity Bowling" to collect donation for the funding; it also enhanced relationships between the Company's stakeholders.

Performance

Received donation from competing teams, which are stakeholders of the Company, such as subsidiaries in PTT Group, customers, suppliers, financial analysts and institutions, as well as governmental agencies and employees. The charity raised the target amount of 554,000 THB.

In 2019, Thairoil Group's employees volunteered a total number of 4 CSR projects, 3 with underserved schools, and 1 conservation efforts for seagrass.

CSR Networking & Branding

The 1st Annual Thairoil Art Contest of 2019



Background

Thairoil recognizes the importance in artistic capacity building for national recognition, and in stepping up to the professional platform. The Company therefore supports Fine Arts, Sculptures and Prints Faculty of Silpakorn University for the 1st Thairoil Art Contest 2019. The theme was "Happiness of Thais." It provides opportunities for fine arts undergraduate students from Years 1 to 5 to participate.

Objective

1. To promote students in fine arts faculty to build and develop their creative capacity, and enhance their own unique style.
2. To distribute arts by students from fine arts, sculpture and prints faculty and others to those interested, allowing exchange of arts with the public in general.
3. To raise awareness of the students from fine arts faculty in their capacity as artists in creating valuable art pieces. This reflects the importance of fine arts faculty and Silpakorn University as leading art institute of Thailand.
4. To promote collaboration between fine arts faculty and external private sector, enhancing creative works and enhance Thailand's art studies.

Performance

A total of 18 pieces were granted awards, all from students of fine arts, sculpture, and prints faculty, Silpakorn University. The students are undergraduate from years 1-5. The awards granted comprises of one outstanding award, two excellent awards, and three complementary awards for supporting Thaioil.

Corporate public relation values (PR value) **5.14** million THB

PTT Group Disaster Management



Background

PTT Group has set disaster management as the primary mission in supporting Thailand in its disaster management, through collaboration with 6 primary companies – TOP,GC, PTTEP,IRPC,GPSC,and PTTOR – to establish the PTT Group Disaster Management Plan.

Objective

PTT Group's disaster support focuses on 5 issues as follows:

1. Donation of non-financial and financial clothing, such as survival bags, food and medicine;
2. Provision of support through employees' expertise and engagement;
3. Service and aid management, such as mobile medical units, disaster recovery unit;
4. Develop and support culture; and
5. Conservation of soil, land, forest, such as reforestation, forest conservation and marine conservation.

Performance

In 2019, Thaioil collaborated with the Nation Foundation and the Civil Alliance Network Dusit Thailand Volunteers to survey damaged areas and fix damaged houses of victims of the Pabuktropical storm in the south. This comprises of financial donations and survival kits. Thaioil also aided victims of the Podul tropical storm, in collaboration with PTT Group. In 2020, Thaioil plans to develop PTT Group Disaster Management to increase efficiency in timely disaster management.

Corporate public relation values (PR value) **3.42** million THB



Performance



Social and Relationship Capital

93.32

community engagement score as a result of engagement activities, site visits, and engagement with communities throughout 2019

24

organizations that benefited through Thaioil's activities, with over

20,000

individual beneficiaries

Performance Summary

Economic Performance ⁽¹⁾	Unit	2016	2017	2018	2019
Economic Value Generated					
Sales revenue	Million THB	274,739	337,905 ⁽⁴⁾	389,042 ⁽⁴⁾	362,179
Economic Value Distributed					
Operating costs ⁽²⁾	Million THB	247,261	305,386	373,128	355,756
Economic Value Retained					
EBITDA	Million THB	32,675	36,925	20,239	13,833
Net profit/ [Loss]	Million THB	21,222	24,856	10,149	6,277
Financial Position					
Total assets	Million THB	217,731	228,108	268,613	283,445
Total liabilities	Million THB	106,134	100,960	142,141	159,521
Total equity	Million THB	111,597	127,148	126,472	123,924
Financial Ratios					
Interest Coverage Ratio	Times	9.4	11.2	5.1	4.2
Current Ratio	Times	3.4	3.8	4.3	3.5
Net Debt to Equity Ratio	Times	0.1	0.1	0.2	0.3
Return on Equity	Percent	21.3	21.7	8.3	5.2
Return on Assets	Percent	10.5	11.4	4.2	2.4
Stock Data					
Basic Earnings / [Loss] per share	THB/Share	10.40	12.18	4.97	3.08
Annual Average Daily Closing Stock Price	THB/Share	66.70	84.23	86.88	68.26
Market Capitalization	Million THB	136,070	171,832	177,238	139,252
Dividend Payment	THB/Share	4.50	5.25	2.65	1.50
Dividend Yield ⁽³⁾	Percent	6.7	6.2	3.1	2.2
Book Value	THB/Share	52.38	59.91	59.66	58.81

Remarks

1. Scope of reporting Economic Performance is in alignment with information disclosed in the Thaioil Annual Report 2019.
2. Operating costs are the expenses related to the operation of a business, or to the operation of a device, component, and piece of equipment or facility or location.
3. Calculated from the annual average of the daily closing stock price.
4. Adjusted figures 2017 and 2018 due to regrouping.

Contributions to Organizations and External Associations ⁽¹⁾⁽²⁾	Type of Organization	Unit	2016	2017	2018	2019
Borad of Trade of Thailand	Trade Association	THB	10,700	10,700	10,700	0
Global Compact Network Thailand	Tax-exempt group	THB	-	-	35,000	35,000
Oil Industry Environmental Safety Group Association	Trade Association	THB	1,477,000	1,740,000	1,799,000	1,832,000

Contributions to Organizations and External Associations ⁽¹⁾⁽²⁾	Type of Organization	Unit	2016	2017	2018	2019
Oil Spill Response Limited (OSRL)	Trade Association	THB	2,370,574	1,973,293	2,187,097	1,779,211
Petroleum Institute of Thailand	Trade Association	THB	684,201	710,993	758,660	786,430
The Association of Private Power Producers	Trade Association	THB	40,000	40,000	40,000	40,000
Thailand Business Council for Sustainable Development (TBCSD)	Trade Association	THB	250,000	250,000	250,000	250,000
The Federation of Thai Industries	Trade Association	THB	121,980	121,980	121,980	121,980
Thai National Shippers' Council	Trade Association	THB	26,750	26,750	26,750	26,750
The Thai Chamber of commerce	Trade Association	THB	24,610	24,610	24,610	24,610
Water and Environment Institute for Sustainability	Trade Association	THB	-	-	53,000	53,000

Remarks

- The scope of reporting is 97% of total sales revenue of Thaioil Group.
- Thaioil Group must not contribute and spend to political campaigns, political organizations, lobbyists or lobbying organizations.

Occupational Health and Safety Performance ^{(1), (2)}	Unit	2016		2017		2018		2019	
		Male	Female	Male	Female	Male	Female	Male	Female
Total hours worked • employees	Hour	1,945,471		2,214,031		2,072,882		2,861,233	
		1,684,378	261,093	1,822,245	391,786	1,844,465	228,417	2,632,203	229,030
Total hours worked • contractors	Hour	5,629,968		3,772,751		5,753,718		18,870,649	
		4,677,579	952,389	3,043,649	729,102	4,707,147	1,052,571	16,409,274	2,461,376

Work-Related Injuries⁽³⁾

Fatality as a result of work-related injury • employees	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
	Case / Million work hours	0	0	0	0	0	0	0	0
Fatality as a result of work-related injury • contractors	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
	Case / Million work hours	0	0	0	0	0	0	0	0
Total recordable work-related injury rate) - TRIR • employees	Case	1		0		0		2	
		1	0	0	0	0	0	2	0
	Case / Million work hours	0.59	0	0	0	0	0	0.12	0.00
Total recordable work-related injury rate) - TRIR • contractors	Case	3		1		2		6	
		3	0	1	0	2	0	6	0
	Case / Million work hours	0.64	0	0.33	0	0.43	0	0.37	0
Lost-time injury frequency rate - LTIFR • employees	Case	0		0		0		1	
		0	0	0	0	0	0	1	0
	Case / Million work hours	0	0	0	0	0	0	0.38	0
Lost-time injury frequency rate - LTIFR • contractors	Case	1		1		0		2	
		1	0	1	0	0	0	2	0
	Case / Million work hours	0.21	0	0.33	0	0	0	0.12	0
Near miss ⁽⁴⁾ • employees and contractors	Case	3,697		3,138		3,393		3,418	

Occupational Health and Safety Performance ^{(1), (2)}	Unit	2016		2017		2018		2019	
		Male	Female	Male	Female	Male	Female	Male	Female
Work-Related Illness									
Fatality due to work-related illness • employees	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
Fatality due to work-related illness • contractors	Case	0		0		0		0	
			0	0	0	0	0	0	0
Occupational illness frequency rate - OIFR • employees	Case / Million work hours	0		0		0		0	
		0	0	0	0	0	0	0	0
Occupational illness frequency rate - OIFR • contractors	Case / Million work hours	0		0		0		0	
		0	0	0	0	0	0	0	0
Process Safety⁽⁵⁾									
Process safety events - tier 1	Event	0		3		2		2	
	Event / Million work hours	0		0.5		0.26		0.09	
Process safety events - tier 2	Event	1		1		1		0	
	Event / Million work hours	0.13		0.17		0.13		0	

Remarks

1. Thaioil and Subsidiaries follow standard statistical reporting of PTT Group in accordance with Occupational Safety and Health Administration (OSHA).
2. Occupational safety and health reports are broken down to employees and contractors in order to illustrate social responsibility of Thaioil and Subsidiaries to operational contractors.
3. Small injuries that only require first aid is not included in the accidents record.
4. Thaioil and Subsidiaries report 'Potential Incident Report (PIR)' in combination with Near Misses (see further in Occupational Health and Safety chapter)
5. Thaioil and Subsidiaries reported process safety in accordance with API RP 754 standard.

People	Unit	2016		2017		2018		2019	
		Male	Female	Male	Female	Male	Female	Male	Female
GRI 405-1 Employees⁽¹⁾									
Total number of employees	Person	1,437		1,447		1,482		1,637	
		1,056	381	1,059	388	1,089	393	1,222	415
	Percent	73	27	73	27	73	27	75	25
Number of employees by level									
All Employees									
• Executives ⁽³⁾	Person	12	3	10	2	9	1	9	1
	Percent	80	20	80	20	90	10	90	10
• Management ⁽⁴⁾	Person	94	52	91	51	97	58	94	63
	Percent	64	36	64	36	63	37	60	40
• Non-Management	Person	950	326	958	335	983	334	1,119	351
	Percent	74	26	74	26	75	25	76	24
Permanent Contract									
• Executives ⁽³⁾	Person	12	2	8	1	8	0	8	0
• Management ⁽⁴⁾	Person	94	51	91	50	96	55	90	60
• Non-Management	Person	950	325	958	334	983	334	1,118	351
Temporary Contract⁽⁷⁾									
• Executives ⁽³⁾	Person	0	1	2	1	1	1	1	1
• Management ⁽⁴⁾	Person	0	1	0	1	1	3	4	3
• Non-Management	Person	0	1	0	1	0	0	1	0

People	Unit	2016		2017		2018		2019	
		Male	Female	Male	Female	Male	Female	Male	Female
Number of employees by age group⁽¹⁾									
• Below 30 years old	Person	252	100	246	93	261	80	374	70
• 30- 50 years old	Person	529	222	522	238	548	259	554	284
• Over 50 years old	Person	275	56	291	57	280	54	294	61
Number of employees by area of work									
Permanent Contract									
• Depot	Person	2	1	2	1	2	0	2	0
• Bangkok	Person	46	128	49	131	48	135	52	145
• Sriracha (Refinery)	Person	1,008	249	1,006	253	1,037	254	1,162	266
Temporary Contract⁽⁷⁾									
• Depot	Person	0	0	0	0	0	0	0	0
• Bangkok	Person	0	3	0	3	1	4	4	4
• Sriracha (Refinery)	Person	0	0	2	0	1	0	2	0
ATTRACTION									
GRI 401-1 New employees hired⁽¹⁾									
Total number of new employees hired	Person	66		55		70		197	
		40	26	32	23	53	17	166	31
• Below 30 years old	Person	34	17	27	17	50	10	157	18
• 30- 50 years old	Person	6	9	5	6	3	7	8	13
• Over 50 years old	Person	0	0	0	0	0	0	1	0
Total new hire rate	% of total number of employees	4.60		3.80		4.72		12.03	
		3.79	6.88	3.02	5.93	4.87	4.33	13.58	7.47
Ability to recruit employees	% of the total number of position available for recruitment	85		85		92		80	
RETENTION									
GRI 401-1 Employee turnover^{(1), (5)}									
Total turnover	Person	45		47		43		40	
		26	19	33	14	27	16	32	8
• Below 30 years old	Person	11	7	9	4	8	7	8	3
• 30- 50 years old	Person	5	12	3	5	7	5	6	4
• Over 50 years old	Person	10	0	21	5	12	4	18	1
Turnover rate	Percent of total number of employees	3.14		3.25		2.91		2.44	
		2.46	4.99	3.12	3.61	2.48	4.08	2.62	1.93
Voluntary resignation	Percent of total number of employees	2.37		1.60		1.75		1.16	
		1.42	4.99	1.32	2.32	1.29	3.05	1.06	1.45
DJSI 3.5.4 Employee Engagement									
Employee engagement score	Percent	84		89		85		90	
	Percent	na	na	na	na	85.5	84.5	90	92
Employee satisfaction score	Percent	83		92		96		89	
	Percent	na	na	na	na	96	96	88	92
GRI 401-3 Parental Leave									
• Employee taken parental leave	Person	16		40		35		36	
		12	4	24	16	20	15	17	19

People	Unit	2016		2017		2018		2019	
		Male	Female	Male	Female	Male	Female	Male	Female
• Employee returned to work after parental leave	Person	16		40		35		36	
		12	4	24	16	20	15	17	19
• Rate of employee return to work and stay after using the parental leave	Percent of employees taken parental leave	100%		100%		100%		100%	
		100%	100%	100%	100%	100%	100%	100%	100%

DEVELOPMENT

GRI 404-1 Average training hours^{(1), (2)}

Total training hours	Hours	85,893		71,644		105,032		124,222	
		60,019	25,874	52,340	19,304	81,804	23,228	100,030	24,192
Average training hours for all employees	Hour/Person/Year	57	68	49	50	75	60	81	58
• Average hours of training for executives ⁽³⁾	Hour/Person/Year	102	145	42	269	110	27	94	687
• Average hours of training for management ⁽⁴⁾	Hour/Person/Year	68	84	46	71	74	84	71	69
• Average hours of training for non-management employees	Hour/Person/Year	55	66	50	45	75	56	82	54

Individual Development Plan

Employees who developed Individual Development Plan (IDP)	%	89	97	100	100
IDP Progress	%	82	85	99	90
Employees who have a Career Path	%	87	95	98	98
Rate of promotion ⁽⁶⁾	%	19.28	20.18	15.36	17.15
Expenses for employee development	Million THB	405	417	447	474
	Per Person	282,427	288,182	302,640	289,795

HUMAN RIGHTS

Employee Grievances

Number of grievances about corruption	Case	0	0	0	0
• Resolved grievances	Case	0	0	0	0
• Grievances under investigation	Case	0	0	0	0
Number of grievances about labour practices	Case	3	0	1	0
• Resolved grievances	Case	2	1	1	0
• Grievances under investigation	Case	1	0	0	0

GRI 102-41 Labour Union

Number of employees represented by a trade union ⁽⁶⁾	%	76	74	72	73.83
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Remarks

NA: Not Available

1. Consolidated data of employees assigned from external organizations, both permanent contract and temporary contract.
2. The data excluded paid education leave funded by Thaioil-supported scholarships.
3. Executives include CEO, president, executive vice president, and assistant executive vice president.
4. Management includes vice president, division manager, and section manager.
5. Turnover rate includes employees with voluntary resignation, retired employees, employees who were asked to resign, employees laid off, and fatalities.
6. Scope of reporting includes only Thaioil Public Company Limited.
7. Employees on temporary contracts are full-time employees since Thaioil does not hire any part-time employees.
8. Due to the past 5 years (2013-2017), as Thaioil has been operating according to the strategy to expand the business, numerous employees have been hired in preparation, whereby majority of the employees do not have experience. Nonetheless, employees who have been working with Thaioil for a certain period of time and have experience illustrated an improvement in performance. Thus, in 2016 and 2017, the number of employees promoted was higher than any other years as employees from both categories were seen to be qualified for a promotion and further growing in the organization.

Social and Community Development	Unit	2016	2017	2018	2019
Percentage of operations with implemented local community engagement, impact assessments, and/or development programs	Percent	100%	100%	100%	100%
Number of beneficiaries who used Thaioil's Health and Education Center in Sriracha	Person	56,967	51,649	55,304	69,324
Community Engagement Score	Percent	97.98	93.50 ⁽¹⁾	97.25	93.32
Number of employee volunteer hours	Hour	7,168	17,672 ⁽²⁾	8,376	10,416
Cash contributions	Million THB	2.7	2.9	44.3	65
Value of employee volunteering during paid working hours	Million THB	4.8	4.7	3.3	6.5
In-kind giving	Million THB	0.1	0	1.9	2
Management overheads	Million THB	32.5	27.6	28.3	24

Remarks

- From 2017 onwards, the Community satisfaction score has been changed to Community relationship score to the organization.
- Employee volunteer hours were higher in 2016 as it was during the royal funeral ceremony of His Majesty King BhumibolAdulyadej.

Value Chain Management	Unit	2016	2017	2018	2019
GRI 308-1 and GRI 414-1 Suppliers					
Suppliers ⁽³⁾ that have acknowledged the Supplier Code of Conduct	Supplier	400	520	701	1,116
	Percent	24.98	32.48	43.79	69.64
New suppliers that were screened using environmental and social criteria ⁽¹⁾	Percent	100	100	100	100
Suppliers covered under a high-level environmental, social, and governance risk assessment	Percent	-	-	100	100
Number of grievances received regarding suppliers' and contractors' social and environmental management	Case	0	0	0	0
Ocean Loss Index	Percent by Volume	0.18	0.21	0.20	0.18
Supplier Satisfaction	Percent	93	93	96	93
GRI 414-8Customers					
Number of grievance about customer data leakages/loss	Case	0	0	0	0
Customer Engagement ⁽²⁾	Percent	91	96 ⁽³⁾	96	96

Remarks

- Scope of reporting for performance on customers covered Thaioil, Thai Lube Base, Thai Paraxylene, and Thaioil Marine.
- From 2017 onwards, the Customer satisfaction score has been changed to Customer engagement score.
- Suppliers cover all tier 1 suppliers in the database but not include crude suppliers.

Environmental Performance	Unit	2016	2017	2018	2019
Refinery throughput ⁽¹⁾	Metric ton	13,905,501	15,121,269	15,132,708	14,600,280
Investment on energy projects	Million THB	43	26	0	28
Energy Management and Greenhouse Gases^{(2), (4)}					
Total energy consumption ⁽²⁾	Million GJ	27.39	29.41	31.60	30.7
Refinery energy intensity	GJ/ton throughput	1.85	1.95	2.09	2.10
Total fuel consumption ⁽²⁾	Million GJ	59.95	57.33	58.89	56.01
Refinery fuel consumption intensity	GJ/ ton throughput	4.06	3.79	3.89	3.84
• Natural gas	Million GJ	31.60	35.11	37.28	36.39
• Fuel oil	Million GJ	6.33	2.53	3.19	2.91

Environmental Performance	Unit	2016	2017	2018	2019
• Fuel gas	Million GJ	21.19	18.72	17.48	15.39
• Coke	Million GJ	0.82	0.97	0.92	1.28
• LPG	Million GJ	Less than 0.01	Less than 0.01	Less than 0.01	Less than 0.01
• Diesel	Million GJ	0.01	Less than 0.01	0.015	0.029
• Gasoline	Million GJ	Less than 0.01	Less than 0.01	Less than 0.01	Less than 0.01
• Ethanol	Million GJ	Less than 0.01	Less than 0.01	Less than 0.01	Less than 0.01
Electricity consumption	Megawatt Hour	987,728	1,026,841	1,053,508	987,424
Electricity purchased from external supplier	Megawatt Hour	0	0	0	0
Electricity sold ⁽⁴⁾	Megawatt Hour	1,171,414	1,583,839	1,580,035	1,580,492
Reductions in energy consumption	GJ	470,699	383,009	562,075	1,396,728
Investments in renewable energy	Million THB	1,298	1,212	1,381	1,374
Direct Greenhouse Gas Emissions (Scope 1) ⁽³⁾	Million ton CO ₂ equivalents	3.65	3.40	3.49	3.31
Indirect Greenhouse Gas Emissions (Scope 2) ⁽³⁾	Million ton CO ₂ equivalents	0	0	0	0
Greenhouse gas intensity (Scopes 1 and 2)	Ton/throughput	0.25	0.22	0.23	0.23
Greenhouse gas emissions reductions (Scope1)	Ton	26,406	21,487	32,151	84,265
Indirect Greenhouse Gas Emissions (Scope 3) ⁽³⁾					
• Business partner:Landfilling industrial waste	Million ton CO ₂ equivalents	411	254	542	1,014
• Business partners:Crude oil losses during marine transportation	Million ton CO ₂ equivalents	1,867	1,924	2,121	1,268
• Customers:Fuel	Million ton CO ₂ equivalents	20.4	19.9	24.8	27.2
Air Emissions^{(5), (6)}					
• Nitrogen oxide (NO _x) emissions	Thousand Tons	4.42	4.44	4.50	4.36
• Sulfur oxide (SO _x) emissions	Thousand Tons	7.21	3.49	4.14	4.27
• Volatile organic compound (VOC) emissions	Thousand Tons	1.46	1.42	1.43	1.35
Waste Disposal by Type					
Total hazardous waste disposal	Ton	5,922	4,276	12,707	12,585
• Landfills	Ton	24	18	47	237
• Recycle	Ton	884	1,031	1,425	4,615
• Recovery	Ton	4,685	3,134	11,092	7,173
• Others ⁽⁷⁾	Ton	329	92	143	560
Total non-hazardous waste disposal	Ton	354	241	306	2,331
• Landfills	Ton	161	100	182	195
• Recycle	Ton	95	82	57	2,086
• Recovery	Ton	47	39	67	49
• Others ⁽⁷⁾	Ton	51	20	0	0
Total waste generated	Ton	6,276	4,517	13,013	14,916
Total waste disposed to landfill	Ton	186	119	229	433
	% ton of total waste generated	2.96	2.63	1.76	2.90
Oil and Chemical Spills⁽⁸⁾					
• Significant oil and chemical spills on land	Incident	0	0	0	0
• Significant oil and chemical spills at sea	Incident	0	0	0	0

Environmental Performance		Unit	2016	2017	2018	2019		
Compliance with Environmental Laws and Regulations								
• Fines for non-compliance with environmental laws and regulations		Million THB	0	0	0	0		
• Number of incidents of non-compliance with environmental laws and regulations		Incident	0	0	0	0		
Environmental Performance		Unit	Water				Areas with water stress	
			2016	2017	2018	2019	2019	
Water⁽⁹⁾								
Water withdrawal by source	Total Seawater ⁽¹⁰⁾		Million m ³	19.17	18.23	17.96	17.96	0
	• Freshwater (≤1,000 mg/L Total Dissolved Solids)		Million m ³	0	0	0	0	0
	• Other water (>1,000 mg/L Total Dissolved Solids)		Million m ³	19.17	18.23	17.96	17.96	0
	Total water withdrawal from other sources		Million m ³	4.09	4.63	4.98	4.86	0
	• Freshwater (≤1,000 mg/L Total Dissolved Solids)		Million m ³	4.09	4.63	4.98	4.86	0
	• Other water (>1,000 mg/L Total Dissolved Solids)		Million m ³	0	0	0	0	0
	Total third-party water withdrawal by withdrawal source	Surface water	Million m ³					0
Ground water		Million m ³					0	
Seawater		Million m ³					0	
Produced water		Million m ³					0	
Total Water Consumption	From all water sources		Million m ³	23.26	22.86	22.94	22.82	0
Water discharge by destination	Discharged into the sea		Million m ³	19.45	18.73	18.60	18.13	
Total water discharge ⁽¹⁰⁾	All discharge destinations		Million m ³	19.45	18.73	18.60	18.13	0
Water discharge by level of treatment	Freshwater (≤1,000 mg/L Total Dissolved Solids)		Million m ³	0	0	0	0	0
	Other water (>1,000 mg/L Total Dissolved Solids)		Million m ³	19.45	18.73	18.60	18.13	0
Water consumption	Total water consumption		Million m ³	3.81	4.13	4.34	4.69	0

Remarks

NA: Not Available

- Refinery Throughput includes crude oil and other feedstock.
- Total energy consumption covers TOP, TPX, TLB LABIX, TP and TOPSPP. The amount of fuel, steam, and electricity was accounted as per GRI G4 Manual of EN3. All energy conversion factors were specific value from Thairoil and Subsidiaries' laboratory.
- Thairoil and Subsidiaries follow standard statistical reporting of PTT Group in accordance with WBCSD GHG Protocol. The greenhouse gases include CO₂, CH₄, and N₂O.
- There was no steam sold to outside the organization.
- Thairoil and Subsidiaries follow the Shell International Practice Standard in monitoring occupational health and safety and environmental performance.
- Thairoil and Subsidiaries do not purchased ozone depleting substances including CFCs, HCFCs, halons, and methyl bromide.
- Other waste disposal covers incineration and external wastewater treatment services.
- Oil and chemical spill greater than 1 Barrel on sea and greater than 100 Barrel on land are considered significant.
- Data excludes potable water consumption, which has very small volume compared to water consumption in production process.
- Seawater withdrawal and discharge include excess seawater that has been desalinated from the desalination unit and discharged as freshwater.

Awards and Recognitions



01

Thaioil was named as a DJSI member for the seventh consecutive year, and recognized as the industry leader in the oil and gas refining and marketing industry.

14 September 2019

Thai Oil Public Company Limited was named as a member of the 2019 Dow Jones Sustainability Indices for the seventh consecutive year, and was recognized as the industry leader in the oil and gas refining & marketing industry through sustainable management of economic, social, and governance aspects in alignment with international standards.

02

Thaioil received the 2019 Sustainability Award of Honor for the third consecutive year at the 2019 SET Awards.

26 November 2019

Thai Oil Public Company Limited received the Sustainability Excellence – 2019 Sustainability Awards of Honor at the 2019 SET Awards event organized by the Stock Exchange of Thailand and Money & Banking Magazine. Thaioil also received the Outstanding Investor Relations Awards and the Thailand Sustainability Investment Awards for being included in the Thailand Sustainability Investment (THSI) list.

03

Thaioil received the 2018 NACC Integrity Award.

29 March 2019

Thai Oil Public Company Limited received the 2018 NACC Integrity Award at the 8th NACC Integrity Awards event organized by the National Anti-Corruption Commission. The awards are given to organizations that operate with transparency, follow good governance principles, and uphold corporate governance, business code of conduct, and corporate social responsibility.



04

Thaioil was recognized as a regional leader and received the Strongest Commitment to Sustainable Energy in Southeast Asia award from Alpha Southeast Asia magazine.

17 September 2019

Thai Oil Public Company Limited was recognized as a regional leader in ASEAN and received the Strongest Commitment to Sustainable Energy in Southeast Asia award from Alpha Southeast Asia magazine for the eighth consecutive year. Thaioil also received three national awards, including Best Strategic Corporate Social Responsibility, Best Senior Management IR Support, and Strongest Adherence to Corporate Governance.

05

Thaioil received the 2019 Thailand Corporate Excellence Award for Human Resource Management Excellence.

28 November 2019

Thai Oil Public Company Limited received the 2019 Thailand Corporate Excellence Award for Human Resource Management Excellence at the award ceremony organized under Her Royal Highness Princess Maha Chakri Sirindhorn's Personal Affairs Division. The 2019 Thailand Corporate Excellence Awards was organized by the Thailand Management Association and the Sasin School of Management at Chulalongkorn University.

06

Thaioil received the CSR-DIW Continuous Award for the 11th consecutive year.

23 September 2019

Thai Oil Public Company Limited received the 2019 CSR-DIW Continuous Award at the award ceremony organized by the Department of Industrial Works.



07

Thaioil received the 2019 Thailand Top Company Award.

19 March 2019

Thai Oil Public Company Limited received the 2019 Thailand Top Company Award in the energy industry from His Excellency Professor Dr. Kasem Watanachai, Privy Councilor. The award was organized by Business+ magazine, a leading business magazine in Thailand, and the University of the Thai Chamber of Commerce, to recognize the most successful companies in 2019 that have had excellent performance within their respective industry.

08

Thaioil received the 2019 Drive Award of Excellence in Resources.

27 August 2019

Thai Oil Public Company Limited received the 2019 Drive Award of Excellence in Resources at the annual 2019 Drive Award event held for organizations that have had good operating results in the past financial year and have management systems that cover every dimension. The ceremony was organized by the Faculty of Commerce and Accountancy at Chulalongkorn University.

09

Thaioil received the 2019 Sustainability Disclosure Award.

11 December 2019

Thai Oil Public Company Limited received the Sustainability Disclosure Award from the Securities and Exchange Commission.



10

Thaioil Group received a plaque of honor and an honorable mention at the “100 Hearts Together to Reduce Global Warming” event.

19 September 2019

Thaioil Group received a plaque of honor and an honorable mention at the 2019 “100 Hearts Together to Reduce Global Warming” event organized by Thailand Greenhouse Gas Management Organization, or TGO, for the Thailand Voluntary Emission Reduction (T-VER) Project organized by TOP SPP Company Limited, a subsidiary of Thaioil Group, and seven other Low Emission Support Scheme (LESS) initiatives that increased energy efficiency within Thaioil Group.



11

LABIX received an Honorary Award for having operations that pass the environmental governance criteria.

4 December 2019

LABIX Company Limited received an Honorary Award for having operations that pass the environmental governance criteria at the honorary awards ceremony hosted by the Ministry of Industry for members of the Industry Volunteer Network for Environmental Protection and for companies with operations that pass the environmental governance criteria.



12

Sakchaisit accepted the Global Charter Responsibly Care®.

9 July 2019

Sakchaisit Company Limited accepted the Global Charter Responsibly Care® from the Federation of Thai Industries as part of a group of companies in the chemical industry that are committed to ensuring safety and social responsibility.

LRQA Independent Assurance Statement

Relating to Thai Oil Public Company Limited's Environmental and Social Disclosures within the Integrated Report for the calendar year 2019

This Assurance Statement has been prepared for Thai Oil Public Company Limited in accordance with our contract but is intended for the readers of this Report.

Terms of Engagement

Lloyd's Register Quality Assurance Ltd. (LRQA) was commissioned by Thai Oil Public Company Limited (TOP) to provide independent assurance on the environmental and social disclosures within its Integrated Report 2019 ("the Report") against the assurance criteria below to a limited level of assurance and at the materiality of the professional judgement using LRQA's verification procedure. LRQA's verification procedure is based on current best practise and uses the principles of AA1000AS (2008) - inclusivity, materiality, responsiveness and reliability of performance data and processes defined in ISAE3000.

Our assurance engagement covered TOP's operations and activities in Chonburi, Thailand, including six subsidiary companies and specifically the following requirements:

- Reviewing whether the selected environmental and social disclosures within the Report have taken account of the GRI Sustainability Reporting Standards
- Evaluating the reliability of data and information for the selected environmental and social disclosures listed below:¹
 - Environmental: GRI disclosure 302-1, 303-3, 303-4, 305-1, 305-2, 305-7, 306-2, 306-3
 - Social: GRI disclosure 403-9 a and 403-9b, 403-10a and 403-10b

Note: For safety performance data (disclosure 403-9, 403-10), it also covered TOP's operations and activities in Bangkok, and 3 expansion projects e.g. New Crude Oil Tanks (C-COT), Thai Oil Sriracha Building (TSB) and new Jetty 7/8 within TOP's Operation

Our assurance engagement excluded TOP's operations and activities outside Chonburi, Thailand, any project expansion within Chonburi, Thailand and the data and information of its suppliers, contractors and any third-parties mentioned in the Report.

LRQA's responsibility is only to TOP. LRQA disclaims any liability or responsibility to others as explained in the end footnote. TOP's responsibility is for collecting, aggregating, analysing and presenting all the data and information within the Report and for maintaining effective internal controls over the systems from which the Report is derived. Ultimately, the Report has been approved by, and remains the responsibility of TOP.

LRQA's Opinion

Based on LRQA's approach nothing has come to our attention that would cause us to believe that TOP has not:

- Met the requirements above
- Disclosed reliable performance data and information for the selected environmental and social disclosures as no errors or omissions were detected
- Covered all the issues that are important to the stakeholders and readers of this Report.

The opinion expressed is formed on the basis of a limited level of assurance and at the materiality of the professional judgement of the verifier.

Note: The extent of evidence-gathering for a limited assurance engagement is less than for a reasonable assurance engagement. Limited assurance engagements focus on aggregated data rather than physically checking source data at sites. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed.

LRQA's Approach

LRQA's assurance engagements are carried out in accordance with our verification procedure. The following tasks though were undertaken as part of the evidence gathering process for this assurance engagement:

- Assessing TOP's approach to stakeholder engagement to confirm that issues raised by stakeholders were captured correctly. We did this through reviewing documents and associated records.
- Reviewing TOP's process for identifying and determining material issues to confirm that the right issues were included in their Report. We did this by benchmarking reports written by TOP and its peers to ensure that sector specific issues were included for comparability. We also tested the filters used in determining material issues to evaluate whether TOP makes informed business decisions that may create opportunities that contribute towards sustainable development.
- Auditing TOP's data management systems to confirm that there were no significant errors, omissions or mis-statements in the Report. We did this by reviewing the effectiveness of data handling procedures, instructions and

¹ GHG quantification is subject to inherent uncertainty.

systems, including those for internal verification. We also spoke with those key people responsible for compiling the data and drafting the Report.

- Interviewing TOP's management representative to understand and obtain data and information associated with high level strategic management approach.

Observations

Further observations and findings, made during the assurance engagement, are:

- Stakeholder inclusivity:
We are not aware of any stakeholders excluded from the stakeholder engagement process. However, we believe that the next stakeholder engagement process should pay more attention to the needs and expectations of those stakeholders significantly impacted by the mega-project. This will better determine TOP's sustainability strategy.
- Materiality:
TOP has continued conducting material assessments as part of its business process and we are not aware of any material issues excluded. However, we believe that TOP should expand its information and data on the issues of biodiversity and inequality in its next reporting period.
- Responsiveness:
TOP has robust systems, including clearly defined objectives and targets, in place to respond to significant issues affecting sustainability performance at both local and global levels.
Examples include: GHG emission reduction plans, water management plan, zero waste to landfill and new technology within the CFP project.
- Reliability:
TOP has an established and robust internal system to determine the reliability of reported data, especially for energy consumption. However, we believe TOP should strengthen the level of QA/QC in its data management system to further improve data accuracy.

LRQA's standards, competence and independence

LRQA implements and maintains a comprehensive management system that meets accreditation requirements for ISO 14065 Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition and ISO/IEC 17021-1 Conformity assessment – Requirements for bodies providing audit and certification of management systems that are at least as demanding as the requirements of the International Standard on Quality Control and comply with the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants.

LRQA ensures the selection of appropriately qualified individuals based on their qualifications, training and experience. The outcome of all verification and certification assessments is then internally reviewed by senior management to ensure that the approach applied is rigorous and transparent.

The verification is the only work undertaken by LRQA for TOP and as such does not compromise our independence or impartiality.

Signed

Dated: 17 February 2020



Nit Tanasuthiseri,
LRQA Lead Verifier

On behalf of Lloyd's Register Quality Assurance
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LRQA reference: BGK3323170646537

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GRI Content Index and UNGC Principles COP

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	GRI 303: Water and Effluents 2018	303-1	48-50		
		303-2	48-50		
		303-3	48-50, 119	The standard, methodologies and consumptions used to calculate water withdrawal are not reported.	yes
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Fight Against Corruption	GRI 103: Management Approach 2016	103-1	52		
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Operational Eco-efficiency	GRI 103: Management Approach 2016	103-1	60		
		103-2	60-66		
		103-3	60-66		
	GRI 302: Energy 2016	302-1	61-63, 117-118	To avoid double counting, Thaioil does not report energy consumption / sold of electricity, heating, cooling, and steam, since all were self-generated from primary fuel. Only electricity was sold out to external.	yes
		302-3 _{OSSD}	62		
		302-4	61-63, 117-118		
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	GRI 305: Emissions 2016	305-7	65-66, 118		yes
	GRI 303: Water and Effluents 2018	303-3	63-64, 119	The standard, methodologies and consumptions used to calculate water withdrawal are not reported.	yes
		303-4	63-64, 119		yes
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	GRI 306: Effluents and Waste 2016	306-2	67, 118		yes
	Sustainable Procurement	GRI 103: Management Approach 2016	103-1	68	
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103-3			69-75		
GRI 308: Supplier Environmental Assessment 2016		308-1	70-73		
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Business Performance	GRI 201: Economic Performance	201-1	12-13, 112		

UNGC PRINCIPLES COP

United Nations Global Compact Principles

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Human Rights	Principle 1 : Businesses should support and respect the protection of internationally proclaimed human rights	42-46
	Principle 2 : Businesses should make sure that they are not complicit in human rights abuses	42-46
Labor	Principle 3 : Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining	42-46
	Principle 4 : The elimination of all forms of forced and compulsory labour	42-46
	Principle 5 : The effective abolition of child labour	42-46
	Principle 6 : The elimination of discrimination in respect of employment and occupation	42-46
Environment	Principle 7 : Businesses should support a precautionary approach to environmental challenges	32-41, 48-51
	Principle 8 : Undertake initiatives to promote greater environmental responsibility	60-67
	Principle 9 : Encourage the development and diffusion of environmentally friendly technologies	60-67
Anti-corruption	Principle 10 : Businesses should work against corruption in all its forms, including extortion and bribery	52-57

SDGs PROGRESS

Thaioil assesses the significance of environmental and social impacts in our business activities through our sustainability assessment of material matters. We prioritize the material matters based on both negative and positive impacts, and define targets that are in alignment with the United Nations' Sustainable Development Goals (SDGs). Thaioil's assessment, monitoring, and reporting processes have been developed with reference to the GRI's and UNGC's "Integrating the SDGs into Corporate Reporting: A Practical Guide".

Thaioil's Commitment



2019 Progress

In 2019, Thailoil established additional targets that are aligned with SDG targets 4.3, 7a, and 8.3. We have continued our work towards achieving the targets as reported in 2018, which are aligned with 11 UN SDG targets. Details on our progress are presented in the following table.

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thailoil Targets	Progress in 2019	More Information
SDG 3: Good Health and Well-being 	3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality, and affordable essential medicines and vaccines for all.	To support public health service accessibility of communities in Laem Chabang district, Chonburi Province, and other remote communities.	<p>Thailoil Group's Health and Learning Center for Community</p> <ul style="list-style-type: none"> 69,324 beneficiaries from the use of the Health and Learning Center 5,849 beneficiaries participating in Thailoil's Dental Clinic Project <p>The construction of Thailoil emergency building for Laem Chabang Hospital was completed and commenced operations in October 2019.</p>	Corporate Social Responsibility, page 96-111
SDG 4: Quality education and lifelong learning opportunities for all. 	4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university.	To support educational opportunity for community members of every gender and age, and promote the development of the quality of basic education.	<p>A total of 1,935 beneficiaries, i.e. 89 teachers and 1,846 students, participated in the leadership project for sustainable educational development program (CONNEXT ED)</p> <p>160 youth beneficiaries participated in futsal and football development program</p>	Corporate Social Responsibility, page 96-111
SDG 7: Affordable and Clean Energy 	7.3 Double the global rate of improvement in energy efficiency.	To be ranked as the top quartile of Energy Intensity Index (EII) among the global oil and gas industry by 2023.	Refinery Energy Intensity Index at 83.7 and ranked among a leader group in the oil and gas industry.	Operational Eco-Efficiency, page 60-67

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2019	More Information
SDG 7: Affordable and Clean Energy (Continued) 	7a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	To support accessibility to clean energy for local communities and other remote communities.	Installation of solar panels on 3 hospital buildings, with a combined capacity of 100 MW	Corporate Social Responsibility, page 96-111
SDG 8: Decent Work and Economic Growth 	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services.	To support job creation and sustainable self-reliance in local communities and other remote communities through social enterprise projects.	The Amazon for Chance Project support careers for the underprivileged, the elderly and the young mothers. In 2019, the project supported and generated jobs for 3 individuals with hearing disabilities.	Corporate Social Responsibility, page 96-111
	8.8. Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.	To achieve a total recordable injury frequency rate (TRIR) among the first 10% of the oil and gas industry by 2022.	TRIR at 0.37 cases per million workhours for all workers, better than the 2019 target of less than or equal to 0.50 cases per million workhours	QSHE Management, page 32-41
		To maintain zero incident of Process Safety: Loss of Primary Containment (LOPC) Tier 1	Two events of LOPC Tier 1, at 0.09 cases per million workhours.	
	To implement the human rights due diligence process for 100% of Thaioil operations and to assess human rights risks for all critical suppliers.	100% of Thaioil operations have been subjected to human rights risk assessment 100% of new suppliers responded to ESG self-assessment 100% of Tier1 Suppliers have been subjected to human rights risk assessment	Human Rights, page 42-47	

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thairoil Targets	Progress in 2019	More Information
<p>SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.</p> 	<p>9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, including encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending</p>	<p>To promote an innovative culture and enhance business opportunities in the area of innovation</p>	<p>2 patents granted</p> <p>3.1 million THB earned from commercialized innovation</p> <p>Thairoil Group's 11 Green Products contributed to 32% of the total revenues</p> <p>Innovative knowledge and ideas, initiated by Thairoil Wisdom & Innovation Award, have been applied to 96 improvement projects, valuing at around 1,025 million THB</p> <p>195 employees participated in Wisdom & Innovation Award, an increase of 63% from 120 employees who participated in 2018</p>	<p>Innovation and Customer Stewardship, page 78-85</p>
<p>SDG 11: Sustainable Cities and Communities</p> 	<p>11.1 Ensure access for all to adequate, safe, and affordable housing and basic services and upgrade slums.</p> <p>11.6 Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.</p>	<p>To enhance communities' quality of life through promoting basic infrastructure and knowledge on energy and engineering to ultimately create self-resilience.</p> <p>To minimize environmental impact to communities and conduct proper public participation for all significant capital projects.</p>	<p>More than 20,000 beneficiaries and 24 organizations benefited from community development projects.</p> <p>Project Light for a Better Life under the "CONNEXT ED" project to provide knowledge on electricity system and energy conservation for 2 schools in Chonburi and Chachoengsao provinces</p> <p>100% of significant capital projects passed public participation hearings from concerned stakeholder groups</p>	<p>Corporate Social Responsibility, page 96-111</p> <p>Human Rights, page 42-47</p>
<p>SDG 12: Responsible consumption and production</p> 	<p>12.2 Achieve the sustainable management and efficient use of natural resources</p>	<p>To achieve target of environmental parameters and to maintain zero environmental incidents.</p>	<p>4.69 million cubic meter total water consumption</p> <p>Ocean loss index at 0.18% by volume, better than the target of less than 0.20% by volume</p>	<p>Operational Eco-Efficiency, page 60-67</p> <p>Sustainable Procurement, page 68-75</p>

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thai Oil Targets	Progress in 2019	More Information
<p>SDG 12: Responsible consumption and production (Continued)</p> 	<p>12.4 Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment</p> <p>12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities.</p>	<p>To achieve target of environmental parameters and to maintain zero environmental incidents.</p> <p>To promote green procurement in the organization and enhance environmental, social and governance (ESG) practices with suppliers.</p>	<p>4,360 tons of NO_x emission</p> <p>4,272 tons of SO_x emission</p> <p>1,348 tons of VOCs emission</p> <p>433 tons of waste to landfill</p> <p>Zero significant spill of oil and chemical</p> <p>100% of new suppliers acknowledged SCOC and responded to ESG self-survey</p> <p>No crude suppliers in approved list with present environmental and social impacts</p> <p>Spending on Materials, equipment and office supplies product group as a share of total green procurement spending has increased to 25% since 2018, equivalent to 2,800 kg of carbon dioxide reduction.</p>	<p>Operational Eco-Efficiency, page 60-67</p> <p>QSHE Management, page 32-41</p> <p>Sustainable Procurement page 68-75</p>
<p>SDG 13: Climate Action</p> 	<p>13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.</p>	<p>To reduce GHG emissions by 4% from business as usual in baseline year 2017 by 2022</p>	<p>GHG emission intensity reduced to 0.23 carbon dioxide equivalent per ton through put, equivalent to 7.32% GHG emission reduction from BAU</p>	<p>Climate Change Risk, page 48-51</p>
<p>SDG 16: Peace, Justice, and Strong Institutions</p> 	<p>16.5 Substantially reduce corruption and bribery in all their forms.</p>	<p>To have a clear, transparent, and fair compliance system in place and to maintain zero corruption and fraud incidents as well as to take position of no corruption acceptance in any cases.</p>	<p>Maintained zero corruption and fraud incidents.</p> <p>100% of new employees received training on code of conduct and anti-corruption</p> <p>100% of employees reported conflict of interest.</p>	<p>Fight Against Corruption, page 52-57</p>

Survey of Reader's Opinion

Responses collected from the 2019 Integrated Report Survey of Reader's Opinion will be used to improve and develop the next annual integrated report.



Thank you for your cooperation.

Please mark an X in the box and provide your feedback and opinion in the blank space.

1 Please mark the option that describes you best.

- Shareholder/Investor Customer Employee Community member living around Thairoil's operation
- Supplier Government Academic Student
- Media Other (Please specify.....)

2 How did you receive or access the 2019 Integrated Report?

- Shareholders' Annual General Meeting Seminar/Exhibition/Lecture Thairoil employees
- Thairoil Website Other (Please specify.....)

3 What is your objective for reading the 2019 Integrated Report?

- To gain information about Thairoil. To support an investment decision.
- To prepare your own Sustainability and/or Integrated Report. For research and education purposes.
- Other (Please specify.....)

4 Please rate your satisfaction with the format and presentation of the 2019 Integrated Report.

- Language that is clear and easy to understand High Medium Low Improvement
- Presentation of images, graphs, and tables High Medium Low Improvement
- Book design High Medium Low Improvement
- Overall satisfaction with the report High Medium Low Improvement

5 Please rate your interest in each chapter of the 2019 Integrated Report.

- Group Overview High Medium Low Uninterested
- Business Model High Medium Low Uninterested
- Stakeholders and Material Matters High Medium Low Uninterested
- Strategy Outlook High Medium Low Uninterested
- Corporate Governance and Sustainability High Medium Low Uninterested
- Value Protection High Medium Low Uninterested
- Value Enhancement High Medium Low Uninterested
- Sustainable Value Creation High Medium Low Uninterested
- Performance Summary High Medium Low Uninterested
- Awards and Recognitions High Medium Low Uninterested
- SDGs Progress High Medium Low Uninterested

6 Please rate the 2019 Integrated Report on its reliability and completeness.

- Your understanding of Thairoil's material issues High Medium Low Improvement
- The relevance of the reported sustainability performance with Thairoil's sustainability strategy High Medium Low Improvement
- The appropriateness and reliability of the reported contents High Medium Low Improvement
- The ability of the report to respond to your questions and concern High Medium Low Improvement

7 Do you think that the 2019 Integrated Report covers all of Thairoil's material sustainability issues?

- Yes No

If not, please specify the issues you think are missing and need to be addressed.

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8 Please provide other comments and suggestions for the improvement of the integrated report.

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