





TOP UP

FOR EVERYONE
TOWARDS
SUSTAINABLE FUTURE

ABOUT THIS REPORT

Thai Oil Public Company Limited has published this corporate sustainability report in accordance with the international reporting standards for the 12th consecutive year. The Company has committed to disclose all material information on the corporate sustainable development transparently and accurately. This report covers economic, social, and environmental performance from 1st January to 31st December 2022.

Reporting Approach

This 2022 Integrated Report applies the Integrated Reporting <IR> framework of the Value Reporting Foundation. In addition, the reporting material topics have been identified through a materiality assessment process, while the management approach and performance are disclosed in accordance with the Global Reporting Initiative (GRI) Standards. The Report also reflects the additional indicators for companies in the Oil and Gas industry per GRI 11: Oil and Gas Sector on page 134-137. The report also outlines operational achievement progress in alignment with the 10 Principles of the United Nations Global Compact (UNGC) on page 137, the Task Force on Climate-Related Financial Disclosure (TCFD) on page 137, and the United Nations Sustainable Development Goals (SDGs) on page 138-142. The reporting information on environmental data, safety data, and materiality assessment process has been verified by the external verifier, with the statement of assurance on page 132-133.



Scope of Reporting

The scope of reporting has been determined by consideration of the business relevance, information readiness, and impacts on core businesses, namely, oil refinery business, petrochemical business, lube base oil business, power business, and other businesses. The Report covers only businesses of Thai Oil Public Company Limited (TOP), Thai Lube Base Public Company Limited (TLB), Thai Paraxylene Company Limited (TPX), Thaioil Energy Services Company Limited (TES), LABIX Company Limited (LABIX), and TOP SPP Company Limited (TOPSPP). In addition, the performance related to green products of TOPNEXT International Company Limited (TX) and Thaioil Ethanol Company Limited (TET) is also reported. The reporting coverage is 95% of Thaioil Group's sales revenue.



The 2022 Integrated Report is available for download at https://www.thaioilgroup.com/home/media_ebook.aspx?id=273&lang=en



For additional information on Thaioil Group's performance beyond the scope of this Report, please refer to the 2022 Annual Report (Form 56-1 One Report) at https://investor.thaioil-group.com/form_561_one_report.html

For more information, please contact:

Sustainability Development Function,
Group Company Secretary
and Sustainability Department



Thai Oil Public Company Limited
42/1 Moo 1, Sukhumvit Road
Km.124, Tungsukla, Sriracha,
Chonburi 20230
Tel: +66(0)-3840-8500,
+66(0)-3835-9000
+66(0)-3849-8900

Email: sustainability@thaioilgroup.com
Website: www.thaioilgroup.com

MESSAGE TO OUR STAKEHOLDERS



Thai Oil Public Company Limited has a commitment to “Building Growth on Our Strong Foundation” with the goal of enhancing quality of life through sustainable energy and chemical businesses, along with the development of Environmental, Social, and Governance dimensions.

Mr. Bandhit Thamprajamchit
Chief Executive Officer and President
Thai Oil Public Company Limited

For more than 61 years, Thaioil Group has accumulated the knowledge, experience, and expertise to become the leading company in the oil refinery business. Currently, Thaioil Group has the highest refinery capacity in Thailand and is one of the top oil refineries in the Asia-Pacific Region. Thaioil Group strives for the continuous development to become a sustainable 100-year organization.

Despite recovery from the COVID-19 pandemic, 2022 was the challenging year for Thaioil Group because of the economic fluctuation caused by geopolitical conflicts, which had the cascading effects on Thaioil Group's businesses. Furthermore, the trends of energy transition, the rapid growth of electric vehicle (EV) businesses, and the stricter global environmental policies, Thailand's 2065 net zero GHG emissions target, and technological advancement that influences the behavioral change have exacerbated the challenges. Thaioil Group needs to adapt and create resilience as a response to the changes to become a sustainable energy and chemicals business through the 3Vs business strategic framework as follows:

Value Maximization: Integrated Crude to Chemicals consists of strengthening petroleum and related businesses, such as aromatics, olefins, and high-value product business, to maximize product value and create competitive advantage through the Clean Fuel Project. The Project will increase Thaioil Group's production capacity from 275,000 to 400,000 barrels per day, while enabling for greater production capability to process more heavy crude oils to add value to products by changing from fuel oil to jet fuel and Euro 5 diesel. Furthermore, Thaioil Group will also drive an integrated petrochemical business through an investment in PT Chandra Asri Petrochemical Tbk (CAP), the biggest integrated petrochemical producer in Indonesia. This investment will extend Thaioil Group's business structure to fully cover petroleum and petrochemical businesses.

Value Enhancement: Integrated Value Chain Management consists of expanding business to regional markets that have high demands, such as Vietnam, Indonesia, and India, to gain more accessibility to the various customer needs, coupled with the seeking of investment opportunities for the growth of the customer base, and the investment in the suitable region.

Value Diversifications consists of seeking joint venture opportunities in the high-value businesses as well as researching and investing in the new businesses based on future business growth and market demands, such as electricity business investment to tackle with the fluctuation in oil refinery and petrochemical businesses that may be affected due to the change of future demands. Moreover, the Company will also seek opportunities in the new s-curve businesses through joint venture, and merger and acquisition, particularly in the businesses in megatrends such as biotechnology, new energy and mobility, green hydrogen, or carbon capture, utilization, and storage.

Thaioil Group has set a long-term profit margin target for 2030, consisting of 40% of petroleum and high-value product businesses, 30% of petrochemical and high-value product businesses, 25% of high-value and other new s-curve businesses, and 5% of power businesses in order to diversify risks to low-fluctuation businesses and to align with the future business context and direction of the energy industry.

Besides pursuing opportunities to add value and create business growth, Thaioil Group has reviewed and determined sustainable strategy that systematically supports business strategic plan. This aims to manage risks in all dimensions – namely, Environmental, Social, and Governance (ESG) – and to maintain trust and engagement of Thaioil Group's stakeholders through the 3Es sustainability strategic framework as follows:

Enhance Clean Environment consists of the aspiration to achieve carbon neutrality target by 2050 and net zero GHG emissions target by 2060.

Engage Society consists of the development of quality of life for society in line with the Thaioil Group's strategic directions to focus on petrochemical business and innovations. The Company will also build the capacity of the communities surrounding Thaioil Group's operations and the national society through opportunities provision regarding education, occupation, quality of life, the public health system, and access to clean energy. Thaioil Group also committed to strengthening relationships and the quality of life for communities and society.

Ensure Good Governance consists of the integration of Governance, Risk, and Compliance (GRC) to ensure that there will be no violation of laws and regulations, and maintain transparency in the organization, to become a well-recognized organization in corporate governance. Thaioil Group also promotes corporate values among employees to be equipped with the knowledge on transparent governance and anti-corruption, including collaboration with the anti-corruption network.

With the achievement of the Company's sustainability management in 2022, Thaioil Group has been listed as a member of the Dow Jones Sustainability Indices (DJSI) for the 10th consecutive year, according to the assessment of S&P Global, the world-class financial information provider and world-leading sustainability rater. This recognition affirms the Company's commitment and tangible practices in sustainability management, focusing on environmental, social, and business aspects on an international level recognition.

On behalf of Thaioil Group, I would like to take this opportunity to thank all stakeholders for the unwavering support. Thaioil Group commits to driving business towards a sustainable future. Also, we will maintain our resilience to tackle future situations and challenges, and will insist on creating value for the economy, society, and environment in accordance with our vision of empowering human life through sustainable energy and chemicals.





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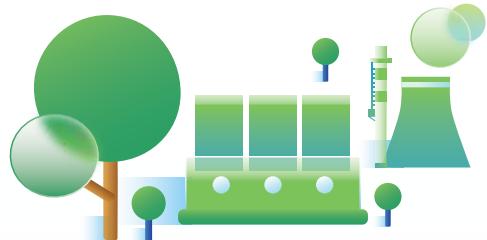
Survey of Reader's Opinion

FINANCIAL AND HIGHLIGHTS





SUSTAINABILITY HIGHLIGHTS



Environmental Dimension

Enhancing environmental management to ensure effectiveness and alignment with global trends



Social Dimension

Empowering social engagement to collaboratively improve the quality of life, while being accountable for all stakeholders towards sustainable development

Manufactured Capital

1,310,492

tons of carbon dioxide equivalents of accumulated carbon credits between 2019-2022 certified by Thailand Greenhouse Gas Management Organization (TGO)

Natural Capital

16,759 tons of carbon dioxide equivalents reduced from energy efficiency improvement projects

Zero industrial waste disposal to landfill

Reduced dependence on external fresh water resources by replaced with desalination

41%

No freshwater withdrawal for consumption from water stress area

No significant oil and chemical spills to the environment.

Intellectual Capital

7

new High-Value Products

Financial Capital

36%

Share of revenue from environmentally friendly products

Manufactured Capital

0.05

process safety event per million work hours

107%

of Refinery utilization rate

Social and Relationship Capital

95.85%

of community engagement index

No complaint

of human rights violation

Human Capital

Zero

lost time injury of employees

89%

employee engagement rate

95%

employee satisfaction rate



Governance and Economic Dimension

Ensuring robustness and maintaining trustworthiness in a good corporate governance system as a strong foundation towards sustainable business growth

Human Capital

No case

in which Thaioil Group's employees breach or violate the Company's corporate governance, code of conduct, business ethics, and anti-corruption practices.

Financial Capital

No financial loss

from business disruption caused by cyber attack incidents.

Revenues generated from the crude oil transfer service through the Company's buoys and reduced crude oil transportation costs

80 million THB

Intellectual Capital

Thaioil Group's innovation maturity

Level 3 out of 5 levels

Social and Relationship Capital

No case

of non-compliance with the Company's code of conduct violation, laws and regulations, and actions that may induce corruption.

89% employee engagement rate

95% employee satisfaction rate



ABOUT THAIOIL GROUP



THAI OIL PUBLIC COMPANY LIMITED

Thai Oil Public Company Limited, the largest petroleum refinery business in Thailand, has been operating for more than 60 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. Thaioil operates under the Operational Excellence principle, as an integrated group of businesses in oil refinery, petrochemicals and lube base. Thaioil leads the Thai refinery industry through a well-planned and integrated production process, yielding optimum efficiency and enhancing competitiveness. The high qualified in the top quartile of refineries in Asia Pacific giving Thaioil to maintain business stability.

Vision

Empowering 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
- Teamwork and Collaboration

- Ownership and Commitment
- Innovation

- Social Responsibility
- Vision Focus
- Integrity
- Excellence Striving

Headquarter :
Bangkok, Thailand

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

Registered Capital :
20,400,278,730 THB

Percentage of shares owned
by PTT PLC. : **48 %**

Refinery Production in 2022
Approximately :
294,000 barrels per day

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

Domestic distribution
29%
of total domestic finished
oil demand

Locations of operations :
**Thailand, Vietnam,
Singapore, Hong Kong,
and Indonesia**

Number of Employees :
1,851 persons



THAIOIL'S VALUE CHAIN AND MARKET OUTLOOK 2022

In 2022, the global economy was facing a pressure from the Russia-Ukraine conflict and the COVID-19 pandemic, which gradually receding but still have substantial impact on the economic activity. Such situations have resulted in an all-time high global inflation. Consequently, the energy and product prices have risen in parallel with the cost of living. With these risks and uncertainties, global economic growth is expected to slow down from 6.0% in 2021 to 3.2% in 2022 and 2.7% in 2023 according to the International Monetary Fund (IMF). In addition, the Company keeps monitoring the monetary policy direction of central banks around the world as it may have a wide-ranging impact. Therefore, the petroleum and petrochemical industries must be prepared for resilience towards these economic situations and changing of the customer behaviour. The core business of Thaioil Group is refinery and the extension of the refinery's production supply chain. The Company has constantly monitored and analysed the change in market conditions to prepare for the countermeasures. (Please see more details in the 2022 Annual Report (Form 56-1 One Report) in the Market Review and Outlook chapter, page 40)

The Clean Fuel Project

To meet market demand, the Company intends to boost refining capacity to 400,000 barrels per day, increase the share of diesel and aviation fuel products, and terminate production of fuel oils. (Construction in progress)

Euro-5 Standard Oil Production Project

(Commercially operated)

The Study on Development and Investment of Biojet Fuel Production

(Feasibility study in progress)

Electricity and Steam Production in Sriracha Project

was developed to replace the small power plant (SPP), as the power purchase agreement will expire in 2023. (In progress)

Distribution of products in Indonesia through PT Chandra Asri Petrochemical Tbk (CAP)

(Completed)

High Value Product Development Project

to specifically respond to the demands of customers. (completed)

Investment in 2 startup businesses through Corporate Venture Capital (CVC)

namely, Versogen Company and Increbio Company (Completed)

Feasibility study of Carbon Capture and Storage

(Feasibility study in progress)



Oil Refinery

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

Crude Oil Market and Refining Industry

Due to Russia-Ukraine conflict, coupled with the COVID-19 pandemic, the average price of Dubai's crude oil has increased to 96.3 USD per barrel in 2022 from 69.5 USD per barrel in 2021.

The refinery industry is rebounding from the previous year. After the international conflict, several countries began to use oil in electricity generation rather than natural gas. As a result of the increase in crude oil demand, the price of crude oil reached a new high.

Domestic Petroleum Product Market

Thailand's economy has been growing after the recovery of COVID-19 pandemic. Since people began to resume their regular lives and increase in tourism, the national demand for refined oil has climbed up by approximately 13.6%. Likewise, the national average petroleum production of oil refineries has increased to 936,515 barrels per day in 2022 from 876,130 barrels per day in 2021. The Company's oil production volume has remained the greatest proportion of all national production in the country, accounting for 29.2% of total domestic production.



Power and Steam

Extensive business operations to strengthen business stability, including natural co-generation power plants that primarily use natural gas fuel to support Thaioil Group's electricity consumption, and steam production that supports other operations.

Power Industry Market

In 2022, the total power capacity in Thailand was 49,196.5 megawatts, an increase of 5.39% from 2021. The peak power consumption of the year was 32,255 megawatts, which has increased by 7.03% due to high temperatures in the summer. In the next year, it is possible that electricity demand is likely to rise in line with the country's GDP.



Petrochemicals

The business has utilized by-products to add value to the refinery's production chain, including the production of aromatics and linear alkyl benzene.

Aromatics Market

The paraxylene market was pressured by the increase in regional supply. This is the outcome of industries reopening in China upon the lifting of lockdown measure. As a result, supply grew by 3.4 million tons while demand climbed by 2.2 million tons, approximately.

The benzene market was still under pressure from the increase in supply, which reached over 2.3 million tons while demand increased only by 0.8 million tons due to sluggish demand for downstream products, which was induced by concerns about the economic slowdown after several central bank interest rate hikes. Nevertheless, economic activities have recovered after the reopening of countries in the region, which was a supporting factor for the benzene market.

Linear Alkyl Benzene (LAB) Market

LAB prices increased due to the surge in feedstock prices. This coincided with the rise in global oil prices after the Russia-Ukraine war. In addition, the global economy has entered a recession as interest rates have risen and the supply has increased by approximately 0.14 million tons per year. Nevertheless, as the demands for cleaning products increased, LAB demand in the Asia region increased by 0.03 million tons per year.



Lube Base

The business has utilized by-products to add value to the refinery production chain, including lube base oil, asphalt, and low emission rubber oil.

Lube Base Oil and Asphalt Market

The lube base oil market has slightly slowed down due to an increase in supply, which was caused by the increase in the regional production capacity after the relief of the COVID-19 lockdown measures. The lube base oil market, group 1, is deemed to be at a good level. The reopening and relief of lockdown measures in several countries also resulted in an increase in lube base oil demands.

The price of asphalt in Asia increased comparing with 2021 because of the tight supply. Due to the conflict between Russia and Ukraine, the major refinery in the region decreased its asphalt production to produce high-priced petroleum products instead. As a result, the price of asphalt rises, putting pressure on the purchase of asphalt in the region. The continued downturn in the asphalt market is a consequence of the demand pressure driven by the hold-up in transportation network improvement.



Solvents

The business has utilized refinery by-products to joint venture companies to produce solvents and distribute in Thailand and Asia-Pacific.

Solvents Market

The demands in the solvent market have slightly decelerated due to the global economy. This affects the increase in oil prices, and gross solvent and chemical prices rose by 20-30% compared to the previous year. In the meantime, transportation costs, inflation, and interest rates have increased accordingly. All these factors impact the decline in demands of solvent and chemical products.

As Thai economy gradually recovering in the first half of the year, the demands of solvent and chemical products increased. Nevertheless, in the second half of the year, the demands significantly declined due to the increase in product prices in the global market. The intense competition in the market was heightened by the discrepancy between declining demand and rising supply. Domestically, the sharp rise in prices of solvent and chemical products has diminished demand from various industries.



Ethanol

The production support business with the utilization of renewable energy.

Ethanol Industry Market

The domestic demand for ethanol used in blending gasohol has increased to 3.8 million litres per day, or by 3.6% compared to 2021. The surging demands are contributed by the rising usage of cars in transportation due to the recovery of COVID-19 pandemic and the country's reopening for tourists.

The domestic ethanol supply rose in 2022 compared to 2021. This is mostly due to the increase in sugarcane planting sites after an increase in the price of sugarcane and sugar on the global market. Moreover, the proportion of cassava ethanol also increased due to a larger amount of cultivated cassava than the previous season. The cassava ethanol price increased by 7.7% in 2022, with an average price of 27.40 THB per litre, compared to 25.40 THB per litre in 2021. This is also because of the rising cost of raw materials after the increase in foreign demands for cassava and the prolonged Russia-Ukraine conflict.



New Opportunities Business

Investment in Corporate Venture Capital (CVC) to seek business opportunities in new industries (Step Out business) and support new business expansion (Other New S-Curve).



Other supporting businesses

Businesses that support management, including:

- Human Resource Recruitment
- Treasury / Financial Management
- Social Enterprise
- Digital and Information Technology
- Engineering Expertise

BUSINESS MODEL

The Macro Environment

Sustainable development has become the top priority on the current global agenda. The landscape of sustainable development has not only emphasized from the business and financial perspectives, but the Environmental, Social and Governance (ESG) dimensions are also emphasized. The sustainability directions that may influence Thaioil Group's business operations include the technological change, alternative energy that may replace oil use, COVID-19 pandemic situation that may change the lifestyles, and the change of laws and regulations around the world that has become more stringent. Thaioil Group therefore recognizes the importance of aligning strategic directions in short and long-terms to tackle with the business risks and opportunities to build confidence and create long-term sustainable values for stakeholders. (Please see more details in the Thaioil Group's Business Strategy Outlook chapter, page 22)

Capitals /Inputs

Financial resources of Thaioil Group consist of debt and equity financing, with the total of 158,657 million THB and 285,923 million THB respectively. In 2022, the Company had the total operating expenses of 481,137 million THB to support the business activities in strategic plans.

Thaioil Group invested in procurement, development, and maintenance of infrastructure to optimize production capacity. In 2022, Thaioil Group's assets were 445,581 million THB.

Thaioil Group is aware that natural resources are limited and irreplaceable. In 2022, Thaioil Group's consumed 14.3 million tons of refinery throughputs, a total of water and energy consumption at 21.9 million m³ and 47.31 million GJ, respectively. The Company also implemented 17 energy efficiency improvement projects that would help limit the Company's natural resources dependence.

In 2022, Thaioil Group had 1,851 employees to support the Company's growth. Also, 589 million THB were invested in employee training and development.

Thaioil Group believes that stakeholder engagement and maintaining good relationship are crucial for sustainable growth. In 2022, Thaioil Group's contributed approximately 296 million THB to communities through community development programs and donations.

Thaioil Group's employees possess the organization's knowledge to drive forwards the operational excellence in response to the customers' needs as well as building upon a culture of innovation to support various work processes. In 2022, Thaioil Group invested 13 million THB on the research and development.



Outputs

Products

294,000 barrels of refined oil per day.	2,559 GWh of electricity.	89,828.06 tons of environmentally friendly products (TDEA, TRAE & AROS)
596,000 tons of Aromatics.	141,635.19 tons of Linear Alkyl Benzene (LAB).	3.26 million tons of CO ₂ equivalents.
205,000 tons of Lubricants.	64.5 million liters of Ethanol (TET).	11,250 tons of generated waste.

Emission and Waste

Greenhouse gas emissions (Scope 1 & 2)
3.26 million tons of CO ₂ equivalents.
11,250 tons of generated waste.
No industrial waste disposed in landfill.

18.74 million m ³ of treated wastewater.

Sustainable Value

Operating business with sustainability strategy, organizational purpose, and contribution to the achievement towards the UN SDGs are essential to create long-term value for stakeholders and Thaioil Group. (Please see more details in the SDGs Progress chapter, page 138-142)

Outcomes to Thaioil Group

- + EBITDA 37,187 million THB.
- + 74.08 million THB in cost savings from energy efficiency improvement projects.
- + 80 million THB of revenues generated from the crude oil transfer service through the Company's buoys and reduced crude oil transportation costs.
- + No incidents and fines from non-compliance with laws and regulations as well as the cases of corruption and bribery.

- + 107% of Refinery Utilization Rate, increased by 7% from the previous year.
- + Gross Refining Margin (GRM) increased by 42% or 14.3 USD per barrel.

- 3.26 million tons of CO₂ equivalents of greenhouse gas emissions (Scope 1), increased from the previous year.
- + Accumulated carbon credits from alternative energy development projects in Co-generation power plants with the total of 1,310,492 tons of CO₂ equivalents.
- + 879,880 tons of CO₂ equivalents of greenhouse gas emissions (Scope 3) avoided through low-carbon product sales compared to general oil products, increased by 8.55% from the previous year.

- Employee turnover rate, increased from 2.72% to 4.97%.
- Employee engagement index decreased from 94% to 89%.

- Community engagement index decreased from 96.74% to 95.85%.
- + Customer engagement index increased from 94% to 95%.
- + Supplier satisfaction increased from 93% to 98%.

- + Thaioil Group's innovation level is at level 3 out of 5 levels.
- + 7 new high-value products.
- + No financial damage from cyber-attacks.

Outcomes to Stakeholders

- + Market Capitalization 114,752 million THB.
- + Net profit per share increased by 153% or 15.63 THB per share.
- Annual average of daily closing stock price decreased by 0.83% or 53.93 THB per share.
- + Dividend Yield increased to 6.90%.
- + 8,918 million THB of government tax payment.

- + Shareholders' long-term returns from investments in procurement, construction, and maintenance of lands, buildings, and equipment.

- + Net freshwater consumption decreased by 5.42% from the previous year.
- + 0.14 million GJ per year of the reduction of dependency on external natural gas through energy efficiency projects, resulting in 16,759 tons of CO₂ equivalents reduction of greenhouse gas emissions (Scope 1).
- + 879,880 tons of CO₂ equivalents of greenhouse gas emissions (Scope 3) avoided through low-carbon product sales compared to general oil products, increased by 8.55% from the previous year.

- + 316 average hours of employee training and development per person.
- + 4,185 million THB of employee welfare.
- 0.34 cases per million hours of Total Recordable Injury Frequency Rate (TRIFR) of employees and contractors.

- + People benefited from Thaioil Group's Health and Education Center, equates to 32,114 visits.
- + 1,179 employees volunteered to work with local communities, equates to 6,450 hours.

- + Employees gained suitable skills and knowledge for the changing world through knowledge sharing projects, such as internal activities, TOP Innovation Newsletter, and Thaioil Wisdom and Innovation Awards Program.

Further details of Thaioil Group's 2022 performance are provided in the following chapters:

- About Thaioil Group (page 8-9)
- Thaioil Group's Business Strategy Outlook (page 22-26)
- Corporate Governance and Sustainability (page 27-37)
- Sustainable Supply Chain Management (page 111-119)

- About Thaioil Group (page 8-9)
- Thaioil Group's Business Strategy Outlook (page 22-26)

- Environment Impact Management (page 40-49)
- Climate Change Management (page 50-59)
- Circular Economy (page 60-67)
- Sustainable Supply Chain Management (page 111-119)

- Human Rights (page 70-75)
- Human Health and Safety (page 76-82)
- Human and Organization Development (page 84-89)

- Human Rights (page 70-75)
- Human and Organization Development (page 84-89)
- Corporate Social Responsibility (page 90-97)
- Innovation and Customer Stewardship (page 100-106)

- Human and Organization Development (page 84-89)
- Innovation & Customer Stewardship (page 100-106)
- Digital Transformation (page 107-110)



STAKEHOLDERS AND MATERIALITY MATTERS



Stakeholder Engagement

Maintaining a good relationship between business and stakeholders is crucial for long-term value creation. With that in mind, Thaioil Group has established the internal functions to continuously reach out and maintain constant communication with each group of stakeholders to perceive their expectations and perspectives of the Company's business operations. This is to ensure the Company is steering towards the right direction, in parallel with improving the efficiency of business operations.

Thaioil Group has identified stakeholders by analyzing their relevance along the value chain starting from crude oil procurement until post-utilization product disposal. Additionally, The Company evaluated the impact and influence levels as shown in the figure below.

Stakeholders Identification Along the Value Chain

Crude oil sourcing

Supplier : raw material distributor
Society : potentially affected people from the distribution process

Production process

Employee : works in the refining process
Subcontractor : works in the refining process
Government Agency : establish rules, regulations, and standards for manufacturing and conducting business
Community : potentially affected by business activities

Product distribution

Customers : people who purchase or use the products
Government Agency : establish product rules and regulations, such as quality controls for petroleum product

Product usage

Society : product user

End of use

Supplier : waste collector for disposal
Customers : waste collector for transforming into value-added products
Society : Potentially affected by emissions and other wastes

Shareholders – financial capital provider

Based on the above value chain analysis, Thaioil Group categorized all stakeholders into 6 main groups, and established stakeholder engagement approaches for all groups. Since COVID-19 pandemic situation, Thaioil Group has adjusted engagement approaches and frequency towards mainly online approaches as shown in the table below.

Stakeholder Engagement Approach

Stakeholder	Engagement Approach
 Shareholder/ Creditor/ Financial Institution	<ul style="list-style-type: none"> Annual General Meeting (AGM) Annual Report (Form 56-1 One Report) and Integrated Report Quarterly meeting with analysts and rating agencies 20-30 quarterly company visit and roadshow events, both domestic and foreign 7 Opportunity Day and SET Digital roadshow events per year TOP IR application and Investor Relation webpage Grievance mechanism: Investor Relations function, and Corporate Governance function email
 Customers	<ul style="list-style-type: none"> Annual online customer engagement survey Annual Report (Form 56-1 One Report) and Integrated Report Online meeting with customers Weekly, monthly, and quarterly e-news Occasional customer engagement Grievance mechanism: Customer Relations function, and Corporate Governance function email
 Suppliers/ Contractors	<ul style="list-style-type: none"> Annual supplier seminar and webinar Post-engagement survey Annual online supplier engagement survey Annual Report (Form 56-1 One Report) and Integrated Report Occasional meeting with supplier and contractor during procurement process Email communication for every occasion Grievance mechanism: Supplier Relations function, and Corporate Governance function email

Stakeholder	Engagement Approach
 Employees	<ul style="list-style-type: none"> Annual Labor Union meeting Bimonthly meeting with Employee Committee Annual online employee engagement survey Annual Report (Form 56-1 One Report) and Integrated Report Quarterly “CEO Connect” Forum (Live) Monthly joint meeting between the management and employee representatives Monthly “Akanee” Magazine Weekly and monthly newsletters or e-news Welfare benefit and employee activity access application, such as “SAP JAM” application Grievance mechanism: Employee Relations function, and Corporate Governance function email
 Community/ Society	<ul style="list-style-type: none"> Annual community engagement survey Annual Report (Form 56-1 One Report) and Integrated Report Bimonthly journal “Thaioil Group Journal for the Community” Monthly meeting with community leaders and tripartite meeting Monthly community visit and event Communications through social media and digital platform such as Line official account Thaioil Group Community Health & Learning Center Grievance mechanism: Community Relations function, and Corporate Governance function email
 Suppliers/ Contractors	<ul style="list-style-type: none"> Annual feedback survey Annual Report (Form 56-1 One Report) and Integrated Report Meetings with government representatives and public agencies Monthly tripartite between Thaioil Group, government agencies, and communities Grievance mechanism: Government Affairs function, and Corporate Governance function email

Thaioil Group's Materiality Assessment Process

Thaioil Group has analyzed material topics that significantly impact the stakeholders and business in accordance with Global Reporting Initiative (GRI) Standards. In addition, Thaioil Group has applied the International Integrated Reporting Council's Value Creation concept for materiality matters. The process has been verified by an independent third party.

Thaioil Group's Materiality Assessment Process



In 2022, Thaioil Group has assessed materiality topics and integrate the results from the assessment with sustainability strategy in the Strategic Thinking Session to support strategic planning, target setting, and managing six capitals – namely, Financial Capital, Manufactured Capital, Natural Capital, Human Capital, Intellectual Capital, and Social and Relationship Capital.

Step 1: Material Topic Identification

Thaioil Group identified material topics in 2022 through the internal and external driver assessments. The **internal drivers** are SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis; short-term, medium-term, and long-term business strategic direction; and corporate risk profile. While the **external drivers** are the issues of interest from Dow Jones Sustainability Indices (DJSI), material topics from peers in Oil Refining industry, United Nations Sustainable Development Goals (UN SDGs), global and national trends as analyzed by credible organizations, such as World Economic Forum (WEF). The results from the internal and external driver assessment were then reviewed to identify additional material topics that could be added to the list of material topics from the previous year.

Step 2: Material Topic Prioritization

Thaioil Group prioritized material topics in 2022 through materiality assessment result review from the previous year with external drivers that may have impact on Thaioil Group's business. The stakeholder's engagement was also proceeded through surveys and interviews to assess their interests and expectations as well as impacts on our ability to create values on each business direction. Material topics were then grouped into low, medium, and high level of importance through percentile ranking. Thaioil Group then prioritized each material topic in accordance with 2 dimensions:

- 01 Impact and importance to Thaioil Group's ability to create value, and**
- 02 Impact and importance to the stakeholders**

Step 3: Validation of Material Topics

To ensure completeness of Thaioil Group's material topics, the Sustainable Development function was the first in line to review the assessed and prioritized material topics. The results were reported to the Sustainable Development Steering Committee meeting chaired by the CEO and president for the final review and endorsement of the material topics considering the internal and external impacts.

Moreover, an external independent verifier was invited and participated to ensure the accuracy and completeness of the materiality assessment process, stakeholder engagement, and in conjunction with safety and environmental performances.

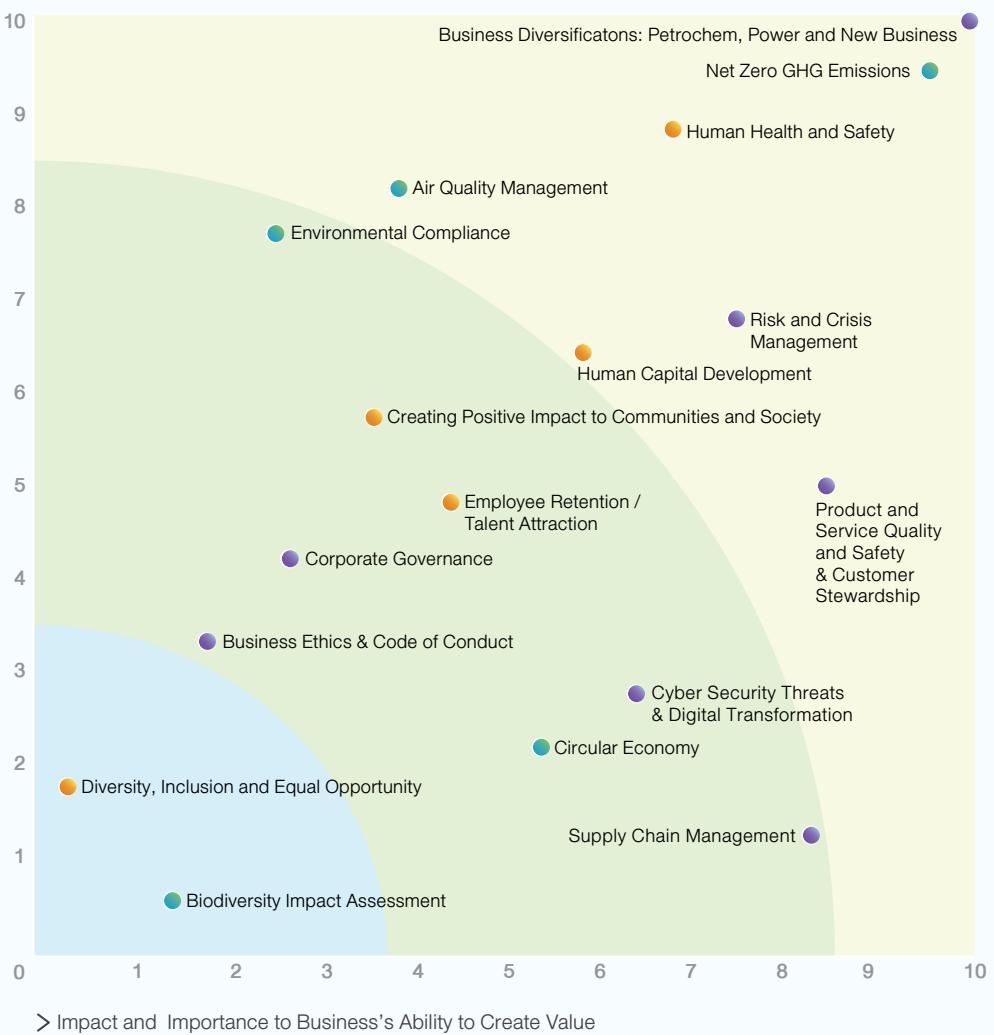
Results of 2022 Materiality Assessment

The materiality assessment result in 2022 presented the changes in external context that affected stakeholder expectations. Those changes have positively and negatively impacted the stakeholders and long-term value creation in business, especially the intensified interest in climate change that creates the needs for businesses to move towards the low-carbon society and the emergence of COVID-19 pandemic that affected the lifestyle of the society and community

surrounding the refinery. Moreover, there are needs to develop human capitals to support future business expansion and diversification, more stringent laws, rules, and regulations of countries and regions around the world, as well as behavioral change of consumers that shifted to focus more on environmentally friendly products. The results of materiality assessment in 2022 can be found in the materiality matrix as follows.

Thaioil Group's Materiality Matrix 2022

▽ Impact and Importance to Stakeholder



Environment



Social



Economic / Governance

Sustainability Context	Risks, Opportunities, and Impacts on Business	Expectations and Viewpoints Expressed by Stakeholder Representatives	Related Material Topics	Sustainability Strategies to manage material topics			Details of Management Approach	Capital and Value Creation
				Environment	Social	Governance and Economic		
Energy Transition	<ul style="list-style-type: none"> Technological transitioning towards fossil fuel replacement with alternative energy might affect Thaioil Group's revenue and long-term business growth 	<ul style="list-style-type: none"> Various stakeholders expect Thaioil Group to expand and diversify business, while responding to the global trends and the rapid change of consumer behavior as well as the alternative sources of energy that may replace fossil fuels in the future to build sustainable business growth 	 Business Diversification: Petrochem, Power, and New Business				Thaioil Group's Business Strategy Outlook (page 22-26)	 
COVID-19 Pandemic	<ul style="list-style-type: none"> Infection risks in the area of operations that may disrupt the operations for at least 5 days 	<ul style="list-style-type: none"> Various stakeholders expect Thaioil Group to have proper risk and crisis management while maintaining appropriate health and safety measures in relation to COVID-19 pandemic mitigation control as well as support in working digitally for flexibility and safety 	 Risk and Crisis Management				Thaioil Group's Business Strategy Outlook (page 22-26)	
			 Human Health and Safety				Human Health and Safety (page 76-82)	
			 Diversity, Inclusion, and Equal Opportunity				Human Rights (page 70-75)	   
	<ul style="list-style-type: none"> Response to COVID-19 Pandemic situation that has changed the lifestyle of the surrounding society and communities of Thaioil Group's refinery 	<ul style="list-style-type: none"> Communities expect Thaioil Group to support projects that aim to improve the quality of life of the surrounding communities during and after COVID-19 pandemic 	 Creating Positive Impact to Communities and Society				Corporate Social Responsibility (page 90-97)	
		<ul style="list-style-type: none"> Suppliers and Contractors expect Thaioil Group to have clear and tangible COVID-19 pandemic control measures that suppliers and contractors can follow in order to work safely and continuously 	 Supply Chain Management				Sustainable Supply Chain Management (page 111-119)	
		<ul style="list-style-type: none"> Risk on product delivery security arisen from the COVID-19 pandemic 	 Product and Service Quality and Safety, and Customer Stewardship				Innovation & Customer Stewardship (page 100-106)	

Sustainability Context	Risks, Opportunities, and Impacts on Business	Expectations and Viewpoints Expressed by Stakeholder Representatives	Related Material Topics	Sustainability Strategies to manage material topics			Details of Management Approach	Capital and Value Creation
				Environment	Social	Governance and Economic		
Climate Change	<ul style="list-style-type: none"> Increased operational costs of Thaioil Group as a result of being unable to comply with new and more intensified climate-related policies, laws, and regulations, such as setting a long-term target towards net zero GHG emissions in accordance with the government's commitments to Paris Agreement Investment opportunities in new business that reduce impacts from climate change Physical risks on water resource and biodiversity 	<ul style="list-style-type: none"> Shareholders, Creditors, and Financial Institutions expect Thaioil Group to disclose more on the environmentally friendly business approaches to support global GHG emission mitigation efforts, which may affect business opportunities, especially for international commerce The government and related public agencies expect that Thaioil Group would invest in environmental projects to support Thailand's GHG emission reduction targets Communities expect that Thaioil Group would take environmental management seriously to avoid causing any damage to the ecosystem and biodiversity, which will affect the wildlife and the communities 	Net Zero GHG Emissions	●			Climate Change Management (page 50-59)	
			Environmental Compliance	●				   
			Air Quality Management	●			Environmental Impact Management (page 40-49)	
			Biodiversity Impact Assessment	●				
Eco-Efficiency and Circular Economy	<ul style="list-style-type: none"> Thai and foreign governments' movements towards circular economy, such as more focus on recycling, or banning single-use plastics Social and consumer trends that shift towards circular economy, with expectations on businesses to reduce environmental impacts throughout product life cycle, which may affect business reputation, revenue, and long-term business growth Opportunities to adapt business direction to align with circular economy to reduce costs and optimize limited resources consumption 	<ul style="list-style-type: none"> Shareholders/Creditors/ Financial Institutions expect Thaioil Group to comply with laws and regulations that align with Thailand's policies in terms of environmental management Suppliers and Contractors expect that circular economy would help improve Thaioil Group's competitiveness in the sustainable manner The government and related public agencies expect Thaioil Group's businesses to be more circular in line with public policies 	Circular Economy	●			Circular Economy (page 60-67)	
			Supply Chain Management	●			Sustainable Supply Chain Management (page 111-119)	   
			Creating Positive Impact to Communities and Society	●			Corporate Social Responsibility (page 90-97)	

Sustainability Context	Risks, Opportunities, and Impacts on Business	Expectations and Viewpoints Expressed by Stakeholder Representatives	Related Material Topics	Sustainability Strategies to manage material topics			Details of Management Approach	Capital and Value Creation
				Environment	Social	Governance and Economic		
Demographic Changes	<ul style="list-style-type: none"> An impact on business as a result of not being able to handle rapid retirements of the aging world population, especially in Thailand, which may affect Thaioil Group's ability to expand and diversify businesses Working behavior and expectations of new generations, such as Millennial and Gen Z, that may be different from traditional working culture leading to difficulties in attracting and retaining potential employees of these generations. This may cause Thaioil Group labor shortages and become challenging in business expansion 	<ul style="list-style-type: none"> Employees expect that Thaioil Group would develop its human capitals to support business expansion as well as building proper work environment, including developing human capitals to fill in the vacancies of retired employees 	 Talent Attraction and Retention				Human and Organization Development (page 84-89)	   
Innovation and Digitization	<ul style="list-style-type: none"> Risk in digital transformation in Oil Refinery business, especially preparedness in terms of workforce to support the transition, which may affect the competitiveness in the industry Opportunities to improve operational efficiency through technology Opportunities to invest in new technology that can affect long-term revenue growth Risks from cyber threats and data breach More robust personal data protection and more frequent cyberattacks 	<ul style="list-style-type: none"> Shareholders/Creditors/Financial institutions expect Thaioil Group to prepare countermeasures against cyberattacks or data breaches that may become more frequent as a result of the digital transformation Suppliers expect Thaioil Group to improve digital system to support business operations in the future Employees expect that Thaioil Group would become an organization that adapts its business and operations towards digitization and continuously improve human capitals to be able to adapt with the change 	 Human Capital Development				Human and Organization Development (page 84-89)	   
			 Product and Service Quality and Safety and Customer Stewardship				Innovation & Customer Stewardship (page 100-106)	   
			 Cyber Security Threats and Digital Transformation				Digital Transformation (page 107-110)	   
Good Corporate Governance	<ul style="list-style-type: none"> Reputation and revenue impact on business from lack of management on increased responsible investment awareness of investors from various institutions in global and national levels that keeps growing such as the development of Thailand Sustainability Investment (THSI) or Negative List Guideline 	<ul style="list-style-type: none"> Shareholders/Creditors/Financial institutions expect Thaioil Group to ensure good corporate governance and transparency Suppliers/Contractors expect to work with Thaioil Group fairly and equally The government and related public agencies expect Thaioil Group to conduct business in line with Corporate Governance Principles, be an ethical organization, and refrain from any corruption 	 Corporate Governance				Corporate Governance and Sustainability (page 27-37)	  
			 Business Ethics and Code of Conduct					



THAIOIL GROUP'S BUSINESS STRATEGY OUTLOOK



Thaioil Group's vision is to



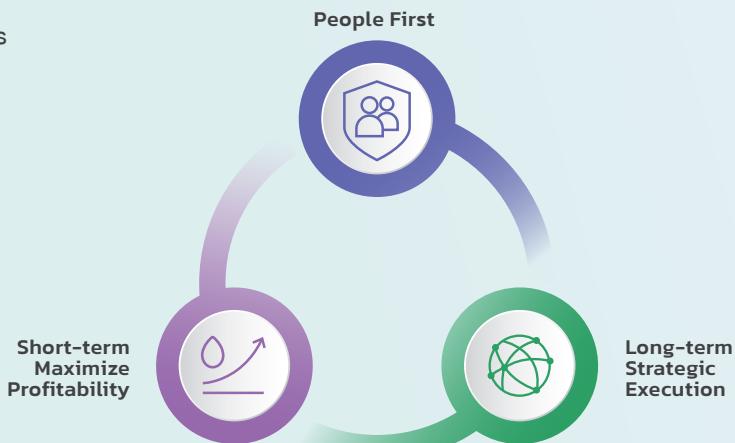
**Empowering
Human Life through
Sustainable Energy
and Chemicals**



Through this vision, Thaioil Group aims to become a highly competitive energy and chemical company through delivery of sustainable returns, enhancing quality of life for all stakeholders, together with driving forwards sustainable growth of the organization. In addition, the Company will maintain the balance across economic, social, environmental, and governance dimension.

In 2022, Thaioil Group has encountered several challenges in various aspects, such as the geopolitical conflict between Russia and Ukraine, the trade war between the U.S., China, and Taiwan that affected the supply chain of significant technological products as well as China's Zero Covid policy. These challenges have significantly caused the fluctuation in crude oil prices, commodities, and the demand for refined oil. Besides, the situations also affected the inflation leading to the increased interest rates by central banks worldwide. Thaioil Group was fully aware of these challenges and concurrently applied the integrated business management. Such action supported the flexibility and readiness to access business opportunities and maximize profits, responding to the constantly fluctuating markets. Furthermore, Thaioil Group has revisited the business strategic directions along with short-, medium-, and long-term business plans for 2022-2030. Consequently, the three main business strategies and approaches were established with the consideration of global megatrends, competitor moves, and the 'New Normal' concept. These establishments were to ensure the effectiveness of Thaioil Group's business plans and strategies could be implemented to support the Company to achieve the goal of sustainable business growth.

Thaioil Group has ensured the business excellence through the three main business strategies and approaches as follows:



01

People First:

protecting and supporting employees to ensure business continuity and prepare for future growth.

The three significant actions have been taken are 1) Executed measures to protect employees and ensure their work efficiency during the COVID-19 situation, for example, providing the 4th dose of COVID vaccine to employees and their families and executing hybrid workplace policy; 2) Initiated a plan to increase manpower and develop employee's capacity to tackle with the competition in the business world, and to align with the strategic direction of Thaioil Group; and 3) Maintained good relationships with all stakeholders to ensure business continuity and sustainability.

02

Short-term Profitability Maximization:

the short-term management to maximize profits focusing on the organizational management towards Integrated Operational and Commercial Excellence throughout the value chain – from crude oil sourcing, production process, to product distribution. This strategy also includes cost management.

Integrated Operational and Commercial Excellence: Thaioil Group has been continuously operating its business with efficiency and flexibility throughout the value chain. The examples of the key practice were the increase of purchasing volume of crude oil with higher sulphur ratio and adjusting production volumes and processes to align with market demands. Thaioil Group increased the share of international sales volume to serve the recovering global demand, especially for aviation fuels and diesel while expanded customer base to high growth regional market. In addition, Thaioil Group also increased sales volumes for end users and high-value products. As the overall performance on customer engagement, Thaioil Group has achieved a score of 95% from customer engagement survey.

Moreover, Thaioil Group has maintained the efficiency in safety and work-related hazard management during major construction and major turnaround. As a result, Thaioil Group has maintained their excellent safety performance and ranked as number 1 among companies in the PTT Group for achieving the least of Total Recordable Case Frequency (TRCF) and being in the Top 10 within the top quartile of the global oil and gas benchmarking by the Oil and Gas UK Benchmarking. Furthermore, Thaioil Group has achieved the operational availability at 99.9% and the utilization rate at 107%.

Cost Management: Thaioil Group has conducted cost management through different measures, including procurement management, effective maintenance plans, the use of co-insurance with the PTT Group, proactive foreign exchange risk management, cost reduction through various financial tools, and tax planning.

03

Long-term Strategic Execution:

Thaioil Group operates its business in line with the direction and strategic plan to generate profits and sustainable growth in long-term. To extend Thaioil Group's value from strong foundation, 3Vs business strategies have been executed.

The 3Vs Strategy

Value Maximization: Integrated Crude to Chemicals



The strategy aims to enhance product's value by integrating the current business's value chain with the future investments in the petrochemical business and high-value products. This also aims to strengthen the resilience and competitiveness by optimizing current production facilities to meet the customer demand. The strategy focuses on 4 main businesses with the details as follows:

Refinery: The refinery business is an important business foundation of Thaioil Group serving as the root of petrochemical business production. Thaioil Group has invested in the Clean Fuel Project (CFP) - where the production capacity is expanding - to utilize various types of crude oil and elevate the product values. This will greatly enhance resilience and competitive advantage in a long term, while supporting the national energy security during the energy transition from traditional energy to new energy.

Aromatics: The aromatics business aims to add value of the products in refinery business and to serve demands of aromatics product in the region.

Olefins: The olefins business aims to add value of the products in the refinery business through investment in the PT Chandra Asri Petrochemical (CAP) in Indonesia, as a joint venture with business partners to pioneer regional markets towards secured growth.

High-Value Products (HVPs): The HPVs business aims to innovate high-value products and to meet customer demands through high-value product development, value chain extension, and partnership.

Value Enhancement: Integrated Value Chain Management



The strategy aims to increase business's competitiveness by developing and distributing Thaioil Group's products to the regional markets together with seeking investment opportunities within the region.

Value Diversification



The strategy aims to secure revenues and to seek the investment opportunities in the new businesses (New S-Curve) corresponding to the future business trends, including:

High-Value Business (HVB): This can be achieved through business partnerships focusing on the high growth rate business which align with the Thaioil Group's strategy and competitiveness. For instance, disinfectants and surfactants business.

Other New S-Curve: This aims to increase the resilience of Thaioil Group's investment portfolio in alignment with the industrial trends and energy transition. Two approaches were implemented: 1) Joint Ventures (JV) and Mergers and Acquisitions (M&A) in bio business, new energy and mobility businesses, and 2) Investment in Corporate Venture Capital (CVC) in sustainability technology business, hydrocarbon disruption technology, and manufacturing technology.

Power: This focuses on the investment in renewable power business to support electricity security and to generate stable revenue for Thaioil Group.

Year: 2023 Short-term Action Plan

Enhancing refinery business's competitiveness through achieving the Clean Fuel Project as planned. Conducting the studies to explore the business opportunities regarding intermediate petrochemical industry expansion towards downstream petrochemical industry of the PT Chandra Asri Petrochemical (CAP) in Indonesia. While exploring business and investment opportunities in high-value product development by adding values to current businesses through the collaboration with business partners within PTT Group and other businesses.

Year: 2024-2027 Medium-term Action Plan

Seeking opportunities for the downstream businesses expansion in the value chain, adding values of the existing products, through the collaboration with business partners in refinery business, lube base oil business, aromatics business, olefins business, and linear alkyl benzene business (LAB). This includes increasing value-added product from the basic products to high-value products.

Year: 2028-2030 Long-term Action Plan

- Strengthening the business's competitiveness in terms of production cost and profitability towards top quartile performance.
- Setting a business target for 2030 to have profit ratios in the petroleum business at 40% and the petrochemical business and high-value products at 30% of the total net profits.

To ensure efficiency and success of the strategies, Thaioil Group's operations are driven by Effective Execution with 4Ps principles, consisting of:



Sustainability Management Strategy

To achieve the corporate vision "Empowering human life through sustainable energy and chemicals", Thaioil Group has set a sustainability goal to become a 100-year organization and a global sustainability leader in the international level through Environment, Social and Governance (ESG) management that create long-term value to the stakeholders across the business value chain and respond to the national policies and global trends.

In 2022, Thaioil Group has reviewed the sustainability strategies which aligned with the systematically advocate business strategies to properly manage ESG risks. The details of the Company's sustainability strategic directions are as follows:

Sustainability Dimension	Strategy	Key Performance Indicator (KPI)
E: Environment	Enhance Clean Environment Enhancing environmental management in line with global trends	Top Quartile Performance: Become carbon neutrality by 2050 and net zero GHG emissions by 2060 through an implementation of the Net Zero GHG Emissions Strategy (3Cs)
S: Social	Engage Society Engaging with community and society to build long-term social value creation	Creating Social Value: Develop quality of life to the society in alignment with the company's strategic direction to become petrochemical and innovative business and contribute to net zero GHG emissions Strengthen Community Engagement: Maintain community engagement score at 90 percent or above Nature-based Solution: Support net zero GHG emissions target through the forest conservation, reforestation, and afforestation initiatives
G: Governance	Ensure Good Governance Ensuring trust in corporate governance and transparency within the organization	Zero Case of Non-Compliance and Fraud Incidents: No cases of non-compliance with laws, regulations, and the Company's code of conduct Good Governance Recognition: Being a recognized organization for good corporate governance



CORPORATE GOVERNANCE AND SUSTAINABILITY

Challenges, Risks, and Impacts

Thaioil Group has been facing challenges in corporate governance mainly due to business transformation and significant changes in laws and regulations that have become stricter and more rigid. As a result, Thaioil Group adopts good corporate governance practices to prevent any illegal exploitations and to align with the changes of business operation in the future.

Commitments and Targets

Thaioil Group adheres to the principle of good corporate governance and business ethics, which is the foundation in creating fairness, transparency, and enhancing business efficiency, positioning it as a pivot of business operation, business success and sustainable growth. In addition, the Company constantly reviews policies, corporate governance practices, and targets.



Management Approach

Corporate Governance

The Board of Directors, executives, and employees at all levels comply with the principle of good corporate governance with fairness, honesty, transparency, and being monitored under the international principles and standards. Thaioil Group has determined the corporate values, called “POSITIVE”, as a mutual practice for all employees. Moreover, Thaioil Group integrates the national and international corporate governance practices to establish management structure and mechanisms under “REACT+E” principle. The campaign to encourage honesty at work to all employees was organized to build awareness and enhance the compliance with code of conduct. As a result, the following corporate culture was formed:

Targets



Case of Non-Compliance
and Fraud Incidents

**2022
Target**

0 Case

**2030
Long-term Target**

0 Case

Responsibility

Responsibility to perform duties with adequate capability and efficiency



Equitable Treatment

Fair and equal treatment for all stakeholders



Accountability

Accountability in one's own decision making and acts and the others under supervision, presenting the ability to inform, and explain decisions made



Creation of Long-Term Value

Vision to create corporate long-term values



Transparency

Transparency in business operation that can be scrutinized and transparent disclosure of information for all relevant parties



Ethics

Ethics and morality in business conduct

Thaioil Group fully recognizes that ignorance or neglect to the compliance with laws, regulations, corporate values, corporate governance principles and business ethics can negatively impact stakeholder's trust. This also can cause a misunderstanding on the Company's corporate governance procedure and consequently affects the Company in both short-term and long-term. Therefore, Thaioil Group pays full attention to strengthen awareness of internal and external stakeholders through policies and practices. In 2022, the Board of Directors has approved the review of relevant policies and guidelines, including Corporate Governance Policy, Anti-Corruption Policy, Corporate Governance and Code of Conduct Manual, Corporate Governance and Sustainability Charter in line with the assessment criteria of Corporate Governance Report (CGR) of Thai Listed Companies, the assessment for Thai Private Sector Collective Action Against Corruption (CAC), and Corporate Governance Code for listed companies 2017. The Company has disclosed policies and corporate governance practices in the 2022 Annual Report (Form 56-1 One Report) in the Corporate Governance Policy chapter, page 93, and on the Company's website at <https://www.thaioilgroup.com/home/content.aspx?id=234&lang=en>.

Furthermore, the Company has integrated Corporate Governance Policy and Anti-Fraud Policy into TOP Way of Conduct as a direction for the employees to support and manage companies under Thaioil Group. This will ensure that everyone is heading in the same direction to achieve long-term targets and sustainable growth (Please see more details in the 2022 Annual Report (Form 56-1 One Report) in the Corporate Governance Report chapter, page 105).

Board Governance and Composition

To effectively optimize the benefits from the directors' efforts and time dedication, the Company requires that all directors have no directorship in more than three listed companies of Stock Exchange of Thailand, which also includes their position in Thaioil Group. (Please see more details in the 2022 Annual

Report (Form 56-1 One Report) in the Board of Directors chapter, page 114).

The Board of Directors consists of at least 5 directors and up to 15 directors. At least half of the directors must be permanent residents of Thailand but not required to hold the Company's shares. The directors are nominated by shareholders at the Annual General Meeting of shareholders. However, in the case of vacancies apart from the term's expiration, the Directors can be appointed by the Board. In addition, at least one-third of the Board, but not less than three directors, must be Independent Directors. At the present, the number of independent directors in the Board is higher than the requirement of the regulations.

As of 31st December 2022, the Board of Directors consists of 14 directors as shown below:

- 1 Executive Director
- 13 Non-executive Directors
 - 5 Non-executive and Non-Independent Directors, of which 1 female director
 - 8 Non-executive and Independent Directors with no female directors
- The average tenure of the Board of Directors are 3.27 years
- The average of Board's meeting attendance is 98.5%

Furthermore, the Company prioritizes the Board diversity in the Board nomination. The Company has established the nomination guideline that respects the gender diversity. Thus, the director qualification will consider by the experience, knowledge and skill that benefit the business. The criteria, in addition, opens to the diversity of gender, race, ethnicity, nationality, and country of origin. These are aligned with the international corporate governance practices in terms of education, knowledge, expertise, experience, and specializations that are relevant and beneficial to Thaioil Group's businesses.

The Company annually organize the Board's performance assessment in accordance with the corporate governance principles. The assessment is divided into two parts, which are 1) the Board of Directors and Board-Committees Assessment, and 2) Individual Self-Assessment and Peer Assessment. Moreover, the Company established a policy to evaluate the Board by independent assessor every three years. This aims to bring opinions and recommendations from the evaluation to enhance the Board's performance (Please see more details in the 2022 Annual Report (Form 56-1 One Report) in the Corporate Governance Policy chapter, page 93).

Thaioil Group has developed Board Skill Matrix that consists of various skills, professions, and expertise, which includes:



As of 31st December 2022

- 8 of 14 directors are listed in the State Enterprise Policy Office's (SEPO) Director's Pool
- 7 of independent directors and non-executive directors (not including the CEO and President) possess Energy/Petroleum/Petrochemical knowledge and experience (Please see more details in the 2022 Annual Report (Form 56-1 One Report) in the Corporate Governance Policy chapter, page 93, and Board of Directors chapter, page 114).

Moreover, the Company determines independent directors to be independent from individual or groups of major shareholders and corporate executives who have the access to financial and business information and other businesses. The purpose is to encourage the freedom of expression and opinions to protect minor shareholders' interests and regularly attend Board meetings. Additionally, the Company has the policy for all directors to attend trainings for further developments, such as the trainings of Thai Institute of Directors (IOD), or the other trainings and conferences related to Thaioil Group's businesses. In 2022, the Board of Directors attended several trainings of IOD, for instance:

- Director Leadership Certification Program (DLC)
- Risk Management Program for Corporate Leaders (RCL)
- Advanced Audit Committee Program (AACP)
- Financial Statements for Directors (FSD)

Roles and Responsibilities

The Board of Directors and the executives have always recognized the importance of the compliance with the corporate governance principles. In this regard, the Company has set the 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". The Board has established 4 subcommittees, namely Audit Committee, Nomination and Remuneration Committee, Corporate Governance and Sustainability Committee, and Risk Management Committee to scrutinize the relevant tasks assigned to each committee and to report their performance at the Board meetings on a regular basis.

The subcommittees must have qualifications as defined by laws and regulations. The Company has specified qualifications, terms, duties and responsibilities, the reporting scope, and performance evaluation of each Board-Committee in the subcommittee Charter.

In 2022, the Board of Directors played a role to consider, review, and monitor the progress of practices related to corporate governance, which can be summarized as below:

- Approved the revision of Corporate Governance Policy, Anti-Fraud Policy, Corporate Governance and Code of Conduct Manual, and Corporate Governance and Sustainability Committee Charter.

- Tracking and monitoring the progress of projects related to corporate governance, corporate social responsibility, and sustainable development. Also, the Board of Directors redressed the grievances process by providing advice and assigning relevant management personnel to continuously report on progress.



The details of the names, roles, duties, responsibilities, and performance evaluation of the Board of Directors and Board-Committees are disclosed in the 2022 Annual Report (Form 56-1 One Report), the Board of Directors chapter, page 114, and qualifications of the Independent Directors in the Corporate Governance Policy chapter, page 93.

Sustainable Development Governance Structure

Thaioil Group Sustainability Management Policy

Thaioil Group's Sustainability Management Policy is committed to pursue the Environment, Social, and Governance (ESG) practices in line with the global trends and support the United Nations Sustainable Development Goals (UN SDGs).



The details of Thaioil Group Sustainability Management Policy are disclosed on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=152&lang=en>

Sustainable Development Structure

The Board of Directors recognize the importance of Environment, Social, and Governance (ESG) in the business operation. ESG is considered as a cornerstone to manage organization towards sustainability through setting policies, goals, and strategies in short, medium, and long terms according to the annual process of business planning or Strategic Thinking Session (STS). In STS, the Board and all management functions collaboratively consider the direction of sustainable matter and the result of Environmental Scanning that may affect business operations in the future.

Thaioil Group manages sustainability matters with specialized functions that are relevant to each matter. Meanwhile, the Sustainable Development team takes the holistic views of sustainability management. Furthermore, the team reports quarterly the performance to the Sustainable Development Steering Committee (Management Level) and reports biannually to the Corporate Governance and Sustainability Committee (Board Level). The results are then reported to the Board of Directors for consideration and acknowledgment on a regular basis. This process will manage Thaioil Group's operations and practices in line with the corporate strategy and assist Thaioil Group in responding to the needs and expectations of all stakeholder groups.

Sustainable Development Steering Committee

The Sustainable Development Steering Committee consists of the President and Chief Executive Officer, and all Executive Vice Presidents. In 2022, highlights of the Committee's execution are shown as follows:

1. Considered corporate materiality topics identified in 2022 and approved corporate sustainability strategies.
2. Considered and drove the study and development plans of "Thaioil Group's Net Zero GHG Emission Pathway" to align with the net zero GHG emissions target by 2060.
3. Steered and supported internal functions to particularly integrate the operations towards sustainable organizations in terms of Environment, Social, and Governance (ESG) dimensions. The key sustainable development plan was also developed to achieve Thaioil Group sustainability targets.



The details of Sustainable Development Structure are disclosed on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=151&lang=en>



Environment

Energy Management and Loss Improvement Working Team

1. Implement energy management and reduce oil loss within the organization that align with the Energy Conservation Policy and targets.
2. Ensure the efficiency of energy management and oil loss reduction by collecting retrospective data, monitoring current power consumption, and evaluating performance against the targets.
3. Organize training and activities to raise awareness of energy conservation and oil loss reduction.
4. Report the results and present data to review and improve policies and procedures.

Environmental and Community Relations Committee

1. Determine the approach to environmental and community relations. Manage environmental impacts from organizational activities in accordance with the Code of Conduct principles on corporate social responsibility to ensure the stakeholders' needs and expectations are adequately responded to.
2. Manage and promote Thaioil Group's activities on the environment and community relations in line with international standards.
3. Analyze and review the effectiveness of environmental and community relations activities. Provide guidance for improvement and report the result of environmental performance and public

relations in accordance with corporate social responsibility principles or international standards.

Waste Management Committee

1. Determine the approach and develop plans for waste and unusable materials management.
2. Drive appropriate waste management systems and tools.
3. Monitor and report the progress to integrate the performance with corporate targets.
4. Review the process and share the lesson learned.

Thaioil Group Circular Economy Working Team

1. Consider the policies, directions, and operational frameworks of the circular economy.
2. Drive, support, and approve the implementation of the plan.
3. Monitor the progress to appropriately align with the targets on the work plan.
4. Report the result and present the data to enable substantial reviews and improvements.

Thaioil Group Net Zero Greenhouse Gas Emissions Working Team

1. Determine directions, policies, and strategies for net zero greenhouse gas emissions.
2. Drive and oversee overall operations in alignment with the plans & targets.
3. Review, monitor, and report progress.
4. Approve the management approach and work plans. Provide support for resources allocation as needed.



Social

Safety, Occupational Health, and Work Environment Committee

1. Review policies and action plans related to occupational health and safety.
2. Report and provide recommendations on the measurement or guideline for improvement to comply with the occupational health and safety regulations and standards, and to ensure the safety of all employees, subcontractors, and any other individual visiting onsite.
3. Promote and support activities related to occupational health and safety, conduct monitoring, reporting, and evaluating performances.
4. Conduct audits of occupational health and safety at the areas of operations and inspect statistics related to the incidents in the operations at least once a month.

Knowledge Management Steering Committee

1. Determine the direction and approach of knowledge management to become an organization of learning.
2. Oversee and support knowledge management in accordance with corporate strategies.
3. Promote the practice of value creation knowledge and elevate the organization efficiencies.
4. Monitor, review, and evaluate performance on regular basis, at least once a year.



Economic and Governance

Thaioil Group Risk Management Steering Committee

1. Determine risk management frameworks, policies, structure, and strategy, including internal control and business continuity management to cope with the changing circumstances.
2. Stimulate the analysis, a ssessment, and determination of the risk management measures.
3. Review, monitor, examine, and report the progress and result of risk management to the Risk Management Committee (RMC) on a regular basis.
4. Approve work plans, approaches, guidelines and provide support for resources allocation as needed.

Thaioil Group Research and Development Steering Committee

1. Determine the direction, master plan, targets, and indicators that support strategic plans and identify the strategic investment approaches in research and development.
2. Promote the use of research and development results for tangible commercial benefits.
3. Evaluate the achievements and monitor progress.
4. Allocate budgets, human resources, tools, equipment, facilities, and promote collaborations with other research institutes.

Corporate Venture Capital (CVC) Screening Committee

1. Examine and approve investment in Venture Capital funds (VC Funds) and the startup companies.
2. Report the performances to the executive management and the Board of Directors meeting.

Thaioil Group Cyber Emergency Response Team (CERT)

1. Determine the strategies for cybersecurity emergencies management.
2. Prepare the crisis management plans with clear roles and responsibilities.
3. Monitor, assess, and provide recommendation to control and recover the operations.
4. Report to the relevant parties, both the executives and the refinery plant, on emergency incidents, response plan, the situation as well as the impact on the production or business operations.

Thaioil Group Digital Steering Committee

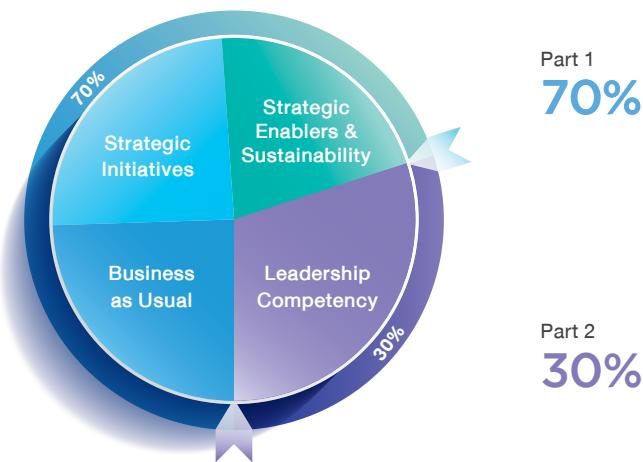
1. Determine the directions, policies, and strategies for digitalization in the organization.
2. Enforce the standards, management mechanism, and management systems as appropriate.
3. Review, monitor, and report progress on digitalization performance to the Chief Executive Officer and President on a regular basis.
4. Approve the management approaches, action plans, and support resources allocation as needed.

Thaioil Group GRC Integration Working Team

1. Study, analyze, and determine action plans and strategies for integrating GRC principles (Governance, Risk & Compliance) within the organization.
2. Determine measures and encourage functions to implement the GRC principles in their management system to maximize their efficiency and with the same direction.
3. Promote and strengthen organizational culture and apply technologies into the business operation.
4. Provide recommendations, monitor, and evaluate performance according to plans and strategies.

Sustainability Performance Indicators

Thaioil Group has determined 2022 Sustainability Performance Indicators which are linked to the compensation of the CEO and the Sustainable Development Steering Committee. The sustainability performance is also reflected into the Corporate Key Performance Indicators cascaded to all levels of employees in relevant departments. This helps to ensure that the Company can achieve the targets of Environmental, Social, and Governance (ESG) management. The components are shown as below:



Part 1) Corporate Key Performance Indicators (70 Percent)

Thaioil Group indicates the Key Performance Indicators under the principle of balance scorecard that are aligned with the direction of “Building on Our Strong Foundation”. The Key Performance Indicators are divided into three areas with similar weights as follows:

01 35% of performance in business as usual, such as:

- Net Operating Profit
- 5-Year Average Return on Invested Capital (ROIC)
- Total Recordable Case Frequency (TRCF)
- Energy Intensity Index

02 35% of performance in strategic initiatives

03 30% for performance in strategic enablers & sustainability, such as:

- Recapitalization & Credit Rating
- Human Capital Index
- Learning Organization: Work-Learning Integration
- Stakeholder Engagement (Customer, Community & Investor)
- Dow Jones Sustainability Indices (DJSI)

Part 2) Leadership Competency (30 Percent)

The assessment of the president and CEO's leadership competency is conducted in six areas, namely building shared vision, organizational management aligned with strategic plan, risks management, team management toward the highest productivity, ability to coach and mentor, and building personal excellence.

Sustainability performance is assessed by using performance indicators across three areas of balance scorecard and leadership competency (Please see more details of the result of performance assessment in the 2022 Annual Report (Form 56-1 One Report), the Executives chapter, page 114).

Code of Conduct and Compliance with Relevant Laws and Regulations

Thaioil Group integrates the business code of conduct into the Corporate Governance & Code of Conduct Manual (CG Manual) as a guideline to conduct a good business. The CG manual is communicated to the directors, executives, and all employees for compliance purpose. The code of conduct includes, but not limited to, the Procurement code of conduct, Intellectual Properties code of conduct, Anti-Money Laundering code of conduct, and Application of Information and Communication Technology code of conduct. The Board of Directors and the executives must act as a role model by demonstrating honest, ethical, fair, transparent, and accountable behavior to build a culture of good corporate governance towards sustainable organization.

The Company places great importance in compliance with the business code of conduct, laws and regulations, and rules that are relevant to the business. The Company is monitoring the practices through integrating the internal departments. A good governance, effective risk management and internal audit and the Governance – Risk and internal control – Compliance (GRC) were supervised to increase the operational efficiency. In 2022, there was no violations of business code of conduct or corruptions among the Board of Directors, executives, and employees.

Moreover, Thaioil Group has received the third-party verification in terms of the corporate governance, including an assessment of Corporate Governance Report (CGR) of Thai Listed Companies. In 2022, Thaioil Group received a CGR score of 98, which has achieved the highest score for the 4th consecutive year and classified in the "Excellence" category (90-100 points) for the 14th consecutive year. Thaioil Group also submitted the renewal of the Thai Private Sector Collective Action Against Corruption (CAC) certification, operated by Thai Institute of Directors (IOD) for the 3rd consecutive year.

Complaint and Whistle-blowing Procedure and Complaint Monitoring, Investigation, and Response

Thaioil Group has established the grievance measure and whistle-blowing procedure with an expectation to receive complaints from stakeholders that has been impacted or exposed to risks from the Company's operations and/or the acts of directors, management executives, and employees regarding violations of laws or code of conduct that might lead to corruptions. Violated entities or those who are impacted by the Company's operations, such as stakeholders, employees, related officers, or external individuals, can submit complaints through provided channels. The details of whistle-blowing procedure are disclosed in the Corporate Governance

Manual published on the Company website at <https://www.thaioilgroup.com/home/content.aspx?id=29&lang=en>.

Thaioil Group also establishes the proper and fair measures to protect complainants, whistleblowers, and relevant individuals from retaliation, such as job reassignment, intimidation, interference in workplace, termination, or other unfair treatments. The Company commits to keep confidentiality of all complaints and will not reveal any information to 3rd parties unless it is required by law.

Furthermore, Thaioil Group has monitored the complaints to increase efficiency of whistle-blowing procedure and response. In 2022, the Company has received three complaints through the grievance and whistle-blowing channels. The Company completed the investigations on these complaints, as specified by the procedure. As a result, it was found that there was no fraud or violations on the Company's rules. Subsequently, the result of this case was notified to the complainants. Although there was no fraud or violations on the Company's rules, the Company communicated to relevant personnel regarding the complaints in order to prevent other similar cases in the future.

The investigated complaints can be categorized as below

Type of Complaint	Number of Cases Investigated	Breach / Non-Compliance Cases
Corruption and Bribery	0	0
Discrimination	0	0
Confidentiality of Information and Use of Inside Information	0	0
Conflicts of Interest	0	0
Anti-Trust / Anti-Competitive Practices	0	0
Money-Laundering	0	0
Quality, Security, Safety, Occupational Health and Environment	0	0
Non-Compliance with the Company's Regulations	2	0
Other Issues of Code of Conduct	1	0

Conflict of Interest Prevention

Thaioil Group has integrated the "Conflicts of Interest Code of Conduct" into the CG Manual as a guideline for all employees to be adhered with. The conflicts of interest were also communicated to management executives and employees through the articles in Akanee magazine, an internal corporate magazine, and e-Newsletter throughout the year. The e-mails were sent directly to all executives and employees and posted on Thaioil Group's intranet. As a result, 100% of management

executives and employees have acknowledged the conflicts of interest rules. Moreover, the Company has also established the Conflict of Interest Disclosure Electronic System that requires all management executives and employees to report their conflicts of interest since joining the Company. Also, any conflict case should be annually reported at the beginning of the year, and report when the conflict arises.

Fight Against Corruption

The Board of Directors and the management executives recognized the importance of the good corporate governance and the fight against corruption, which poses a threat to achieve the target towards the 100-year sustainable organization. With transparent business conduct culture, Thaioil Group has established an Anti-Fraud Policy, roles and duties, responsibilities, practices, and measures for the entire organization by declaring statement that:

“The Board, the management, and employees must not engage in or accept any fraudulent practices under any circumstances embracing Thaioil Group’s businesses in all countries and involving all applicable agencies. Thaioil Group has defined guidelines, measures, and roles of responsible parties as well as instituting regular reviews and revisions of compliance with the policy in line with changes in business contexts as well as applicable laws and regulations ”

Corruption Risks Assessment

Thaioil Group recognizes the importance of risk management throughout the organization. The Board of Directors has assigned the Risk Management Committee to determine corporate risk management policies and to oversee the risk management systems and measures in the corporate, business unit, and functional levels. This aims to reduce the impacts on business operations and to ensure that the corporate goals can be achieved.

The Company has established a working team to drive the integration of Thaioil Group’s GRC. This will ensure that all functions have systematically and efficiently integrated the good corporate governance, risk management, internal control, and the compliance with laws, regulations, and organizational rules into their management.

Besides, Thaioil Group has also assessed corporate governance and corruption risks. The Company has constantly reviewed the risk management plans related to corruption. It was concluded that the plan remained suitable in the present context and did not require any update. The Company has determined the risks and prevention measures for five activities marked in the Corruption Risk Profile – namely, registering lease agreement

with government agencies, seeking permits from government agencies, supporting government agency activities, tax fraud, and procurement processes.

In 2022, Thaioil Group has conducted business in compliance with laws, regulations, and requirements of all relevant public sectors and regulatory agencies to business. There was also no complaint regarding misconduct and actions that may lead to corruption.

Promoting an internal corporate governance culture, and strengthening a good public reputation in corporate governance and anti-corruption

The collaboration with other partners to fight against corruption

Thaioil Group has become a member of the United Nations Global Compact (UNGC) since 2012. The Company applied the 10 UNGC Principles to promote good governance regarding human rights, labour, environment, and anti-corruption to business conduct. Moreover, Thaioil Group has also been a member of the Thailand’s Private Sector Collective Action Coalition Against Corruption (CAC) since 2012. Then, in 2014, the Company has become a CAC Certified Company for the first time. With the membership period of three years, Thaioil Group has renewed the CAC certification and become CAC Re-Certified Company in 2017 and 2020. This allows Thaioil Group to develop transparency in business operations, uplift corporate governance standards, and to reduce risks of being prosecuted under the Anti-Corruption Act 2018. Furthermore, the Company demonstrates the strong commitments regarding the fighting against corruption in all forms through participation in various activities, such as Anti-Corruption Day.

Activities and initiatives to build awareness and understanding of corporate governance and anti-corruption

In 2022, Thaioil Group has embedded the awareness of good governance practices from policy to operational level to develop and promote Corporate Governance (CG) system, the compliance with regulations, and transparency to create business integrity though various activities as follows:

Cultivated awareness and promoted work behaviors that are transparent, fair, and accountable to all employees from the first day of joining the Company. This was conducted through an employee orientation program via e-learning courses on the topics of corporate governance, business ethics, anti-corruption, and regulatory compliance.



Organized various activities for Thaioil Group's employees throughout the year of 2022, such as the online activities to build awareness on the importance of corporate governance, GRC Online quizzes, an anti-corruption idea sharing contest in each function, and Anti-Corruption Day.



Communicated the No Gift Policy to all employees through internal communication channels. The "Request letter to avoid giving gifts to executives and employees of Thaioil Group" was sent to the suppliers, customers, financial institutions, and other business partners to avoid and prevent any cause that may lead to actions that violate Anti-Fraud Policy. The Company also promoted fair and equal treatment to stakeholders.



Communicated information regarding good corporate governance, business ethics, and anti-corruption through internal communication channels, such as the GRC Corner column in Akanee magazine (internal magazine), CG Newsletter, and GRC Newsletter, over the past year.



Conducted a survey to assess knowledge, understanding, and opinions of employees towards Thaioil Group corporate governance through the 2022 Integrated GRC Survey. This assessment aimed to evaluate employees' knowledge and understanding on corporate good governance principle, risk management and internal control, and the compliance with laws, regulations, and requirements. The results were then analysed to develop the working plan for promoting corporate culture and to improve the efficiency in corporate governance.



Collaborated with the PTT Group to organize PTT Group CG Day 2022, a hybrid event, under the theme of "Togetherville – CG Power for Sustainability and Beyond" to promote and disseminate the PTT Group performance on corporate governance, to elevate the corporate governance standards, and to demonstrate the commitment in driving business with corporate governance principles. The event attendees included the Board of Directors, executives, employees, suppliers, and representatives of business partner. Also, the representatives from governance agencies such as the Stock Exchange of Thailand, Thai Institute of Directors, and the National Anti-Corruption Commission also attended the event.

2022 Performance



Human Capital



Zero case

of non-compliance with laws and regulations as well as actions that may lead to corruption by Thaioil Group employees in accordance with Zero Non-Compliance and No Fraud Incident target.



100%

of Thaioil Group employees complied with the principles of corporate governance, business ethics, and anti-corruption as specified in the TOP Way of Conduct. All subsidiaries of Thaioil Group (wholly owned companies) complied with the rules, regulations, requirements, as well as the Company's corporate governance principles and business code of conduct. As a result, no corruption-related actions were identified.



No

breach of Thaioil Group employees against corporate governance principles and business code of conduct.



81%

of the 2022 GRC Survey result showed that the employees had knowledge and understanding of the integration of corporate governance in GRC.

In 2022, Thaioil Group has received the third-party verification on corporate good governance. Through the strong efforts and commitments, the Company has received the acceptance at both national and international levels. The success of corporate governance practices was reflected into the following awards:



- 2012 – Declared the intent Collective Action Coalition (CAC)
- 2014 – Certified as a CAC Certified Company
- 2017 – 1st re-certification as a CAC Re-Certified Company
- 2020 – 2nd re-certification as a CAC Re-Certified Company
- 2022 – Submission of renewal request for the 3rd CAC Re-Certified



- Thaioil Group scored 98 points in the 2022 Corporate Governance Report of Thai Listed Company (CGR).
- Thaioil Group has achieved the highest score for the 4th consecutive year and classified in the “Excellence” category (90-100 points) for the 14th consecutive year.



Environmental Dimension

Enhancing environmental management to ensure effectiveness and alignment with global trends

Thaioil Group is committed to drive business growth with an environmental responsibility throughout the Company's value chain. With this commitment, Thaioil Group operates with a goal to reduce greenhouse gas emissions in the production process by efficiently utilizing natural resources through adoption of circular economy principles into business operations to fortify the environmental sustainability practices, while aiming to be a Net Zero organization in 2060 through energy efficiency, decarbonization, carbon removal, and carbon offset. In addition, Thaioil Group seeks investment opportunities in High Value Business (HVB) and renewable energy business to improve and align our environmental stewardship with future global directions.



Environmental Impact Management



Increasing efficiency and quality of environmental management in the production process in the supply chain to reduce environmental and ecosystem impacts

ZERO

cases of significant oil and chemical spill

100%

environmental compliance without any environment-related violations



Climate Change Management



Managing climate risks and increasing production efficiency to sustainably mitigate impacts from climate change on the environment and society

Sales revenue of environmentally friendly products

36%

of total sales revenue

NO

disruption in the production process caused by water scarcity

Reduction of GHG emissions in the production process

16,759

tons of carbon dioxide equivalent from energy efficiency improvement projects



Circular Economy



Operating business in alignment with the circular economy to reduce costs and optimize natural resource utilization in the production process

Reduced dependence on external freshwater by

41%

through seawater desalination

ZERO

tons of waste disposed to landfill

138,473

gigajoules of energy consumption reduced from 17 energy efficiency improvement projects in the production process



ENVIRONMENTAL IMPACT MANAGEMENT



Challenges, Risks, and Impacts

Thaioil Group recognizes environmental changes and external factors. The rise in global surface temperature causes the climate change and natural disasters such as droughts and floods, the urbanization within limited natural resources, particulate pollution, and the prevention of environmental incidents resulting in biodiversity loss are all taken into account. In response to an intensive environmental policy and global goals, such as the target of carbon neutrality and net zero GHG emissions, Thailand has made a commitment to the United Nations Convention on Climate Change through the Conference of the Parties (COP), which will make climate change laws and regulations more stringent in the near future. All these factors have posed significant challenges for Thaioil Group in elevating the environmental management system to be aligned with global direction, creating values for communities, and preparing for the changes and business adaptations in the future.

Commitments and Targets

Thaioil Group strives to improve environmental management in line with global trends to grow business while being environmentally conscientious. According to the Environment, Social, and Governance (ESG) practices, the Company will reduce the environmental impacts and create long-term business opportunities together with the community as specified in the policy "Thaioil and Subsidiaries' Quality, Security, Safety, Occupational Health, Environment, And Energy Management". The Company has also applied the environmental management system in line with national and international standards to oversee and continuously improve the management system and environmental master plan.



Please see more details of Thaioil and Subsidiaries' Quality, Security, Safety, Occupational Health, Environment, And Energy Management Policy on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=233&lang=en>

Target



Complaint on environmental incidents

2022 Target
Zero Case

Long-term targets 2030

Zero Case



Significant oil and chemical spills into the environment
(Case of significant spills)

2022 Target
Zero Case

Long-term targets 2023-2027

Zero Case



Non-compliance with relevant environmental laws and regulations
(Case of significant spills)

2022 Target
Zero Case

Long-term targets 2030

Zero Case



Non-compliance with the key standards of ISO 14001: 2015

2022 Target
Zero Case

Long-term targets 2030

Zero Case



Compliance with excellent environmental governance standards in petroleum and petrochemical refineries

2022 Target
100%

Long-term targets 2030

100%

Management Approach



Environmental Management System

Thaioil Group takes responsibility in the three key areas, namely Environmental, Social, and Governance (ESG) while the principles of a circular economy are adopted to drive the business forward. The environmental strategies and master plan in the short, medium, and long-term have been established to grow the business while being environmentally conscientious and minimize the environmental impacts throughout the production chain.

Long-term Strategy:

Thaioil Group is committed to promoting business growth while being environmentally conscientious and creating long-term business opportunities. This contains two key strategies – namely, the Net Zero GHG Emissions strategy and the Circular Economy strategy, both of which have a clear governance structure (Please see more details in the Climate Change Management chapter on page 50 and the Circular Economy chapter on page 60).

Short- to Medium-term Strategy:

Thaioil Group is committed to minimizing environmental impacts at the sources, promoting ESG practices to be ready for the changes per global trends and long-term strategy. The Company drives its strategic plan towards “Operational Excellence to Business Excellence (O2Bx)”. The “Refinery in The City” approach has been adopted in the management of businesses to achieve excellence in the three main areas, which are environmental management, social management, and governance compliance. To achieve excellence in these three dimensions, the Company has applied a management approach called the “CARE Concept” as follows:

C	Control Right	A	Awareness & Communication Right	R	Recycling Right	E	Eco-Society Right
	Controlling the environmental impact and maintaining compliance with the regulatory requirements to prevent and minimize potential impacts on communities that may be affected by the production activities, construction, and transportation to maintain the trust of the surrounding community (Community Engagement).		Enhancing awareness, communicating with stakeholders, and building trust in Thaioil Group's ability to prevent and mitigate the impacts of its business operations through its Sustainability Management Policy and Corporate Social Responsibility Policy. This aims to enhance the quality of life for our communities and society, towards sustainable growth.		Managing natural resources for resource efficiency through the 3Rs strategy (Reduce, Reuse, Recycle) and the circular economy principle, in order to support the Sustainable Development Goals.		Creating value to the society through the "Partner for Life CSR" concept to instill volunteerism and corporate social responsibility among employees. Also, the Company promotes a "Volunteer Culture" and encourages the employees to design initiatives for communities towards "Share Value with Society".





To become a global leader in 2025, Thaioil Group operates its business with transparency and fairness, prioritizing the return of appropriate benefits to all groups of stakeholders as well as environmental protection and community happiness. To materialize this goal, the Company has implemented a comprehensive environmental management plan that considers both internal and external environmental factors (Environmental Outlook) to align with the needs and expectations of the stakeholders. This involves communities, government agencies, management executives, and employees who have expertise in the environmental topics, as well as environmental regulations, laws, and global megatrends. All factors are analyzed to identify business opportunities and enhance a five-year environmental plan known as the "Environmental Master Plan". This plan is used as the key framework to drive sustainability in environmental management and ensure effective environmental management to achieve the environmental targets.

The Company enhances employees' knowledge on environmental management and sustainability in alignment with the sustainability and environmental policies and practices. For instance, the carbon tax and net zero GHG emissions trainings were organized. Statutory trainings were also conducted for environmental managers and practitioners in pollution treatment systems, which included 38 attendants. The Company is committed to providing training on an annual basis to enhance employees' knowledge on environmental management for continuous efficiency.

Furthermore, Thaioil Group has governed and developed its environmental management systems through accepted

standards at the national and international levels. For instance, ISO 14001 (the standard on environmental management excellence), ISO 26000 (the standard on corporate social responsibility) under the CSR-DIW project, PTT Group's Operational Excellence Management System (OEMS), the best practices in biodiversity management, the Global Reporting Initiative (GRI), and the best practices identified from the DJSI assessment. To improve and develop environmental management systems, these standards were adopted in the risk assessment, environmental prevention and mitigation measures, operational controls, monitoring, and reporting processes, as well as the execution of the proactive and reactive environmental indicators. The Company has then applied lesson learned and improvements throughout the production process to end products across the value chain that cover operations in various conditions as follows:

Production in Normal Operating Conditions

Thaioil Group conducts risk assessments on environmental issues and preventive measures to prevent environmental impacts from the sources on an annual basis or whenever there are significant changes. Moreover, the Company has been steadily enhancing production efficiency in accordance with the Environmental Master Plan which is used as the operational framework comprised the following topics:

- Governance Structure
- Environmental Technical Procedures
- Climate Strategy
- Water Resource Management

- Eco-efficiency
- Biodiversity
- Supplier and Contractor Program
- Environmental Audit
- Management Information Solutions

For the refinery unit expansion project, Thaioil Group applies the environmental standard specification, which encompasses the requirements, laws, best practices, and fair stakeholder perspectives, based on the environmental principles. This aims to establish the operating framework for the Green Construction Project. The framework is continuously responsive to the requirements and expectations of the relevant stakeholders.

In 2022, Thaioil Group has implemented additional projects, for example:

Environmental dashboard phase 2 involved extension of the effort from the first phase that has been completed to effectively monitor the air and water quality. The Eco-Efficiency Dashboard is additionally implemented to monitor air quality control and enable traceability to such indicators such as GHG, CH₄, SO_x, NO_x, VOCs, waste, water, and significant spills to the environment. The air quality control of PM 2.5 is regularly monitored 24 hours a day, both indoor and outdoor, to monitor the impact on the health and safety of the employees as well as the subcontractors and other relevant stakeholders.

Production in Abnormal Operating Conditions

Abnormal operating condition:

Thaioil Group has established the Environment and Community Relation Committee (ECRC). The Company has worked in partnership with the government agencies, academies, and communities surrounding the production area to improve environmental management and mitigate impacts on all stakeholders through thinking, working, correcting, learning, and developing together. This collaboration starts with setting proactive guidelines and working together to resolve issues during abnormal operating conditions. Environmental performance is monitored and assessed 24 hours a day, seven days a week by the operational team. The ECRC also organizes the activities and communication platforms to track and monitor environmental performance in compliance with the requirements, regulations, and operating targets. To ensure the least environmental impacts on the surrounding communities, the ECRC organizes monthly meetings to address concerns and suggestions for further improvement. Additionally, the perception survey is annually conducted with the community.

In 2022, Thaioil Group has implemented projects with objective to increase the operating efficiency during abnormal situation. For example:

The TOP Green Tracking-Smell Project: This air pollution management system is capable of detecting the bad odour at the potential source quicklier and more efficiently.

The TOP Green Tracking-Oil and Chemical Spill Trajectory Project: A database and prediction dashboard that tracks the movement of oil and chemical spills in the sea. Based on the situations and weather conditions, it can accurately predict and display the direction of spills which help preparing for an abnormal situation or emergency more efficiently.

Environmental Emergency Condition

The prevention of oil and chemical spills is a crucial concern for Thaioil Group's business operations. According to the criteria of the Oil Industry Environmental Safety Group Association (IESG), Thaioil Group has achieved zero cases of significant oil and chemical spill during the course of business operations. The Company has employed the three-pronged management approach to efficiently manage the oil and chemical spill as follows:

01 Prevention

1.1 Using the ships that passed the safety standard assessment of the PTT Group Ship Vetting System. In this assessment, Captains of the Company and the PTT Group will assess safety documents, namely Ship Inspection Report Programme (SIRE), an international standard of the Oil Companies International Marine Forum (OCIMF), ship information from international websites, and terminal feedback of the ships shared with the PTT Group. These documents will be reviewed and considered together with the ship quality audit assessment within the PTT Group to ensure the quality of the ships and crew members of Thaioil Group in line with international safety standards.

1.2 Maintaining ports, buoys, and other equipment used for transferring crude oil and petroleum products. For instance, the Company has regularly maintained oil pipelines at the port and offshore buoys, safety joints, and ship ropes. In 2022, Thaioil Group's Engineering Department has inspected the floating oil pipelines and submarine oil pipelines through a single buoy mooring (SBM). According to the inspection, the oil pipelines at the SBM-1 and SBM-2 met the international safety standard of OCIMF.



- 1.3 Conducting tanker safety checks when domestic and international tankers operate at Thaioil Group's port. The Port Manager regularly assigns the practitioner to inspect tanker safety. In case of detected defects, the practitioner will inform the tanker's captain and manager to resolve and prevent recurrence of such defects. The tanker may be temporally suspended under circumstances where the defects are not aligned with safety standards.
- 1.4 Nominating employees in the port division to attend meetings and participate in activities of the Marine Safety Group of the Oil Industry Environmental Safety Group Association (IESG) in the regular basis. This aims to exchange the marine safety knowledge and to ensure that the operations are aligned with international standards.
- 1.5 Organizing an annual meeting with managements from Thai ship companies (Thaioil – Ship's Owner Meeting) to ensure that the information of ship and port safety, such as updated port rules or defects identified by random ship inspection, is well communicated. Also, the corrective actions are properly taken to improve safety condition during the operation and to prevent accidents and pollutions from both ships and ports.
- 1.6 Preventing leakage of hydrocarbons or hazardous chemicals within Thaioil Group's business activities. Thaioil Group has considered measures to prevent leakages from the design of the distillation unit, primary containment includes secondary containment measures that comply with international engineering standards, and in parallel with raising awareness of the loss of primary containment prevention (LOPC Prevention) through reviewing and enhancing the management processes of the LOPC chain, in which covers reporting, investigating, analysing, and learning from incident (LFI). The proactive and preventive management approaches are also deployed, including corrosion under insulation inspection, flange assurance, and gasket control. Moreover, the Company established the steering committee to drive and support the LOPC Prevention Project towards achieving the safety target of No Harm No Leak Goal Zero.

02 Mitigation

Despite having prevention measures that are aligned with the international standards, Thaioil Group has also developed mitigation measures to cope with the unforeseen incidents as follows:

- 2.1 Employing the emergency response plan to control the spills of oil or petrochemical products within the limited area and promptly eliminate all residues as possible. In addition, Thaioil Group has updated the Initial Response with clearer details to limit the spill area and to take immediate actions. The additional practices to manage oil pollution on the beaches are also incorporated in the plan with the approach of leaving the area once the oil spill cleaning operation ends.
- 2.2 Ensuring the quality and availability of oil removal equipment both in the equipment warehouse and on ships storage to cope with any unforeseen incidents at any time. Thaioil Group maintains the equipment on the monthly basis. The maintenance includes engine testing, spinning system testing, hydraulic oil system inspection, and random inspections conducted by the Occupational Health and Safety Department, Environmental Department, and Quality Control Department – to ensure that the equipment is always available for use.

03 Personnel Development

Thaioil Group prioritizes personnel development to be knowledgeable and capable of oil and petrochemical spill management. In 2022, since the COVID-19 situation has been relieved, enabling the Company to fully conduct the activities related to developing and enhancing knowledge and capacity of the personnel on oil spill cleaning. The activities in 2022 are as follows:

- 3.1 Thaioil Group conducted the exercise of marine oil spill response for the on-duty operators assigned in the Company's Emergency Plan. The exercise simulated a scenario where a crude oil pipeline leakage during oil transfer at the SBM-1 buoy, resulting in the oil spill and consequently spread to the beach of Koh Loy, Si Racha, which is a local fishery area as a significant tourist destination that contributes to the economy of the area.



3.2 Thaioil Group conducted the exercise of marine chemical spill response for the on-duty operators assigned in the Company's Emergency Plan. The exercise simulated a scenario where a benzene pipeline leakage at Jetty-5 port, leading to a benzene spill in the sea. The vapor from the spill spread around the port area and consequently affecting the Ao Udom community. This poses harms to both operators and people living in the community.



3.3 Thaioil Group organized the workshop and training to ensure the knowledge and understanding of the response to the marine oil and chemical spill incidents in the first-line level. Personnels in the port division have brainstormed to find the most efficient practices based on the existing personnel and resources aligning with the Company's Emergency Plan. Consequently, the practices will be tested at Conventional Buoy Mooring: CBM, SBM-1, SBM-2 to gain the understanding, be proficient and efficient, and to find the gaps in the practices for further improvement. Oil & Chemical Spill Workshop and Exercise 2022

3.4 Thaioil Group organized "Thaioil Jetty 7-8 Training FMB-2" at the Smart Ship Maritime Simulations Institute, Australia, for the navigators in Sriracha area and captains in the port division. This training simulated a scenario where the oil and product tanker are docked and left Jetty 7-8. The scenarios were re-created under different situations and environments. This program aims to give familiarity and proficiency to the operators at Jetty 7-8 to ensure that the operation is safe for the human lives, assets, and the environment.



3.5 Thaioil Group participated in the training and seminar to exchange the knowledge of marine oil spill removal and beach cleanup with various public and private agencies, that are responsible for the marine oil spill cleaning. The participants included Chonburi Provincial Government;

Marine Department; Thai Maritime Enforcement Command Center; Pollution Control Department; Department of National Parks, Wildlife and Plant Conservation; Department of Fisheries; Department of Disaster Prevention and Mitigation; Oil Industry Environmental Safety Group Association (IESG); Thai Oil Public Company Limited; PTT Public Company Limited; and Esso (Thailand) Public Company Limited.



In 2022, COVID-19 was deemed to be the residual risks. With the Company's strict measures that avoided external meetings attendance involving large number of people, Thaioil Group did not participate in the 2022 RITAG conference in the foreign countries.

In 2023, Thaioil Group has developed the following plans:

1. Conducting an exercise of oil spill clean-up with the Oil Industry Environmental Safety Group Association in Sriracha (IESG-SASC). This is a joint exercise between Thaioil Group, PTT Group, and Esso.
2. Conducting Shoreline assessments on Sichang Island with the Oil Industry Environmental Safety Group Association in Sriracha which will be the second assessment after the first assessment in the previous 5 years. This aims to determine any significant change for developing the pre-incident plan in case of an onshore oil contamination.
3. Organizing a workshop to enrich the knowledge and understanding on the response to a marine oil spill or chemical spill in first line level for personnel in the port division.
4. Conducting the exercise on marine oil and chemical spill cleansing, which has been upgraded into National Plan for Water Pollution Prevention and Elimination from Oil Spill (Tier 2).
5. Developing personnel skills, expertise, and knowledge through nominating personnel for participating in trainings or conferences related to marine oil spill prevention and treatment.

2022 Performances



Natural Capital



Social and Relationship Capital

100%

compliance with ISO 14001:2015

Zero case

of significant oil and chemical spills into the environment

Remark: The oil and chemical spills that are greater than 1 barrel to the sea and 100 barrels to the land are considered as significant spills.

100%

environmental performance compliance with environment laws and regulations

100%

compliance with relevant environmental laws and regulations

100%

compliance with excellent environmental governance standards in petroleum and petrochemical refineries

Remarks: Scope limited to TOP, TLB, TPX, and LABIX companies



Biodiversity Management

Thaioil Group has applied the PTT Group Biodiversity and Ecosystem Service Manual that had been reviewed together with the PTT Group. This manual was developed based on the integration of various national and international standards such as the Master Plan for Integrated Biodiversity Management, the GRI Standard, IPIECA, and others. The Company uses this manual to perform a biodiversity risk assessment within its businesses. According to the assessment, the operating area of the Thaioil Group is at the level of low risk. Nonetheless, the Company continuously and strictly monitors the biodiversity impacts in compliance with the environmental impact assessment (EIA). The Company also avoids having an impact on net forestation by striving to offset, restore and reforest to compensate in case of forestation loss from our operations (No Net Deforestation). This aims to ensure that the Company has the least environmental impact and No Net Loss (NNL) of biodiversity, both on land and in the ocean, because biodiversity is an invaluable resource for everyone.

2022 Performances



Natural Capital



No deforestation

and encroachment in conserved forest areas by Thaioil Group.



Please see more details of Thaioil Group Position Statement on Biodiversity on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=171&lang=en>



Air Quality Management

Thaioil Group dedicated to minimizing its environmental impact while growing its business while being environmentally conscientious and supporting its communities. To achieve this, the Company has determined the target for air quality control, including nitrogen oxides (NO_x), sulphur oxides (SO_x), volatile organic compounds (VOCs), and particulate matter (PM), and installed high-quality technology to conduct excellent production processes. Moreover, the Company regularly monitors and measures air quality both at the sources and at the surrounding area, according to the plan. The technology has also

been adopted to display real-time results and to track the performance of air quality against international best practices. The Company is also annually audited and certified for its environmental management system and performance by external parties.

NO_x and SO_x Management

Thaioil Group has assessed environmental impacts and determined preventive measures to control NO_x and SO_x emissions from the production processes. The primary source of emissions is from fuel combustion. To control and minimize these emissions, the Company has installed high-quality technology that is internationally recognized and continuously operated the Sulphur Recovery Unit (SRU) system. The SRU system can effectively convert sulphur from waste gases into a liquid product for use in other industries instead of emitting it into the environment. Furthermore, the Company upgraded all burners to Ultra-Low NO_x in 2010 to effectively reduce nitrogen oxide emissions from combustion. The Company also controls the usage of low-polluting fuel over the high-polluting fuel and regularly monitors the smoke from combustion (White Smoke Monitoring) to avoid the impact on the community. Moreover, Thaioil Group measures the air quality both at the sources and in the surrounding communities by using advanced technologies such as the Continuous Emission Monitoring System (CEMS) and the Air Quality Management System (AQMS). The air quality is also measured and audited by an external party and reported daily in the Environmental Daily Dashboard. Consequently, Thaioil Group managed nitrogen and sulfur oxide emissions at levels that were better than the required standard while achieving the set target in 2022.

In 2022, Thaioil Group has implemented additional projects to control SO_x and NO_x emissions, including:

- Thaioil Group, together with the Ministry of Industry, conducted a study and promoted a new regulation, "Re Factories to Install Special Device or Equipment for Reporting Air Pollution from Factory Chimney B.E. 2565 (2022)".
- Thaioil Group, in collaboration with the Federation of Thai Refinery Industries and the Petroleum Institute of Thailand, conducted a new study on the PEMS (Predictive Emission Monitoring System) project to replace the CEMS project. This project aims to provide factories with alternative options for monitoring air quality and achieving sustainable development in accordance with international standards.

VOCs Emissions Management

Thaioil Group manages Volatile Organic Compounds (VOCs) emissions through environmental impact assessment. The Company has also implemented preventive and monitoring measures of VOCs emissions from various sources in the production process, including flares, combustion, tanks, loading, effluent treatment plants, and fugitives, through operational excellence management as follows:

- **Flares and Fuel Combustion:** The Company strictly adheres to the production procedures to maintain the highest efficiency of fuel combustion and prevent undesirable incidents that may create to flares in the combustion tower.
- **Tanks and Loading processes:** The Company selected the most suitable tank for storing the chemicals and oil. The Vapor Recovery Unit (VRU) was also installed with up to 99% efficiency to treat VOCs from continuous product transfer.
- **Effluent Treatment Plants (ETP):** The Company regularly tracks and monitors VOCs to improve its wastewater treatment system. The ETP Cover Project has been initiated. The project is now in the process of installing an ETP Cover system to reduce VOCs emissions into the environment.
- **Fugitives:** The Company controls and monitors ventilations through the VOCs leak detection camera. The camera helps identify leak points in accordance with the regulations, international laws, and standards specified in the US Environmental Protection Agency (US EPA) 2012. This also provides opportunities for further improvement to eliminate leakage.

In 2022, Thaioil Group has implemented additional projects to control volatile organic compound emissions, for example:

- The Company adopted the air pollution management system of the TOP Green Tracking project in the real practice and actively communicate with relevant agencies to ensure proper usage and operation. Moreover, the Company increased its efficiency in identifying the potential sources of odor pollution to resolve them and find appropriate control measures promptly and effectively.
- Thaioil Group conducted a study in partnership with the Federation of Thai Refinery Industries and the Petroleum Institute of Thailand to drive VOCs emissions legislation from flare stacks, storage tanks, and turnarounds to serve as a guideline for controlling VOCs from these sources.



Particulate Matter (PM) Management

Considering the prevalence of the PM 2.5 crisis in both Thailand and abroad, Thaioil Group has established a working group called the “PM 2.5 Taskforce” to drive the project, monitor the situation, and determine the management approach. The Company consistently communicate activities to control PM 2.5 under the 4C measures (Control, Contain, Clean, and Check). These approaches are implemented to reduce environmental impact at the sources, such as office buildings, production processes, construction projects, and community areas, and support governmental activities and measures. Besides, the Company regularly measures PM 10 and PM 2.5 by using the Air Quality Management System (AQMS) and audits by external parties.

In 2022, Thaioil Group has implemented additional projects under the 4C measures, for example:



C-1 Control: The Company maintained the air quality at a better level than the standards and legal requirements. The use of vehicles and roads was limited through several activities, such as the carpool campaign, pick-up and drop-off services, and the “Fast & Flow” strategy to manage traffic flow. Also, the Company monitored and controlled the vehicles’ conditions and their black smoke, as well as ensuring the proper use of covering of dusty material on dump trucks.



C-2 Contain: The Company organized an activity to control the level of dust on the walkway. The activity aims to reduce diffused and accumulated dust by installing a dust collection net, using tarp covers to prevent dust from transport vehicles, setting up wheel washes in the construction area, installing water spray, and providing dust protection masks for employees and contractors working in the risk area.



C-3 Clean: The Company established cleaning measures in the buildings, lorry loading areas, and construction sites, such as carpet cleaning, air purifiers, 5S activities, Big Cleaning Day, and the TOP Green Road project, and supported government initiatives by spraying water to control the dust levels on Sukhumvit Road.



C-4 Check: Based on the site audit measure, the Company tracked dust pollution levels from the Pollution Control Department station, including the TOP AQMS lorry station, and used a PM 2.5 NONG PIM detector to detect air quality both indoors and outdoors.

2022 Performances



Natural Capital



NO_x emissions decreased by

2.23%

compared to
the previous year



SO_x emissions increased by

25.90%

compared to
the previous year



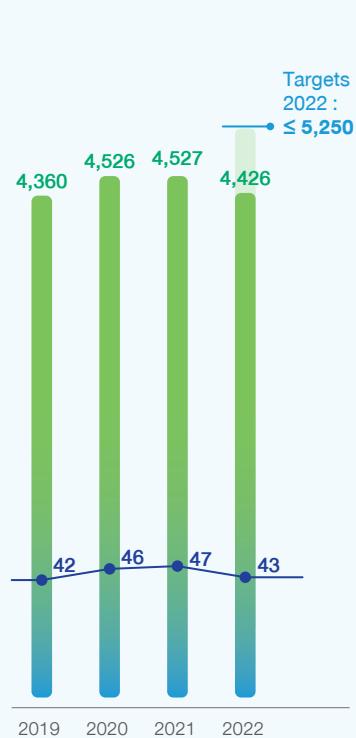
VOCs emissions increased by

0.40%

compared to
the previous year

The amount of NO_x emissions

█ Ton
█ Ton per million barrels
of crude oil equivalents



The amount of SO_x emissions

█ Ton
█ Ton per million barrels
of crude oil equivalents



The amount of VOCs emissions

█ Ton
█ Ton per million barrels
of crude oil equivalents





CLIMATE CHANGE MANAGEMENT



Challenges, Risks, and Impacts

According to the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27), the global temperature tends to increase faster than expected. Thailand has then considered to shift the GHG emission reduction target compared to the baseline in 2015 from 20-25% to 40% within 2030 and has committed to become carbon neutrality in 2050 and to achieve net zero GHG emissions in 2065.

To drive forward the national commitment and to increase driving forces in GHG emissions management to the public and private sector, Thailand is now drafting the National Climate Change Act, or Global Warming Act, which will soon to be enforced. The Act covers the reporting standards and economic mechanisms to motivate the private sector in GHG emissions reduction. The measurements will also be established to encourage the citizens to change their behaviors to mutually mitigate climate change problems, such as development and promotion of public transportation system, clean energy production and consumption promotion, and electrical vehicle endorsement through Thailand Integrated Energy Blueprint.

Furthermore, the climate change topic has received strong attention from the stakeholders. Noticeably, social movement has increased among the civil sector, investors, and other agencies. Such stakeholders have expectations towards oil and gas businesses to tackle the climate-related risks that may influence and change the Thaioil Group's operation and how the business develop their products to meet the customer demands in order to become a low-carbon society. Thaioil Group is aware of these challenges and has assessed its risks and opportunities to determine the most effective long-term strategy.

Commitments and Targets

Thaioil Group prioritizes GHG management. The topic has not only accelerated climate change rapidly but also affects human health, livelihood, and access to the good environment quality. The Board of Directors and the management executives of Thaioil Group and its subsidiaries have acknowledged the importance of the future business directions towards clean energy businesses and the low-carbon economy. The Company focuses on the feasibility study of new businesses, including high-value environmentally friendly products, process optimization for maximum efficiency, and determining tangible strategies as well as setting long-term targets in line with the national targets.



Management Approach

Governance and Oversight

The Board of Directors has annually reviewed the corporate climate change strategies and applies risk management process as a tool to assess future business impacts. The climate risks are monitored on quarterly basis. The Board is also tracking climate-related key performance indicators including Energy Intensity Index to evaluate the performance of management executives and employees.

In 2022 strategic review, the Board endorsed the Net Zero GHG Emissions Strategy and supported the preparation of the Net Zero GHG Emissions Pathway and Roadmap. Meanwhile, the adjustment of investment portfolio was also considered to align with the energy transition trends through increasing energy efficiency and conducting a study on the investments in sustainable businesses such as blue and green hydrogen or sustainable aviation fuel.

Moreover, the Board has assigned the Corporate Governance and Sustainability Committee to oversee and monitor the

progress on a semi-annually basis. The Sustainable Development Steering Committee, chaired by the Chief Executive Officer and President, is also assigned to drive forward the implementation and monitor the progress on a quarterly basis. The executives of Thaioil Group take responsibility for the management in line with the established strategy. The Net Zero GHG Emissions Governance Structure is established where the Vice President of the Sustainability Function is supervising overall management. The structure consists of Strategic Planning Function, Production Function, Business Development Function, Research and Development Function, and Corporate Social Responsibility Function. The functions have roles to assess climate-related risks and opportunities, conduct the work as per the organizational climate strategy, develop action plans and Thaioil Group's Net Zero GHG Emissions Pathway and Roadmap, and report the performances and the risk and opportunity management to the committees on a regular basis.

Thaioil Group's Net Zero Greenhouse Gas Emissions Governance Structure



Climate Strategy

In 2022, Thaioil Group has established the Net Zero GHG Emissions Strategy with three focused areas, namely the 3Cs strategic pillars with details as follows:



Climate-Related Risk and Opportunity Management

Thaioil Group has evaluated the resilience of the Net Zero GHG Emissions Strategy through scenario analysis as well as the business impacts from each climate change scenario. The climate-related risks and opportunities were assessed in 2030, 2040, and 2050. According to the Task Force on Climate-related Financial Disclosure (TCFD) recommendation, the analysis was conducted in 2 scenarios compared with the baseline scenario as described as follows:



1. The Transition Scenario Analysis

Thaioil Group has assessed climate-related risks and opportunities considering 4 factors, namely, regulatory, technological, market, and reputational. The two scenarios were analysed in year 2030, 2040, and 2050 across the supply chain, from upstream to downstream, as follows:

01 Stated Policy Scenario (STEPS) – this scenario represents a pathway considering the current policies and targets that the Thai government has announced including the Nationally Determined Contributions (NDC) under the Paris Agreement.

02 Sustainable Development Scenario (SDS) – this scenario represents a “well below 2°C” pathway by International Energy Agency (IEA), to achieve a transition towards low-carbon economy and to align with the commitment of net zero emissions.

Regulatory Risk and Opportunity

Thailand’s commitment to GHG emission reduction at the Conference of the Parties to the United Nations Framework Convention on Climate Change is the factor that may affect current business operations and future investments. This may pose risks for Thaioil Group once new laws and regulations are enforced to drive the country towards net zero goals. For example, National Climate Change Act or Global Warming Act requires GHG emissions disclosure and actions toward national GHG emissions reduction target. Meanwhile, economic mechanisms, such as carbon taxes, and emission trading schemes, may be applied in the near future. Besides, the carbon pricing can pose a risk on raw material price as the carbon price from crude oil might be included from the upstream countries. The EU’s Carbon Border Adjustment Mechanism (CBAM) may affect the exportation of some petrochemical products. Additionally, the National Electric Vehicle Policy Committee has announced the 30@30 Policy, which sets a goal for 2030 that 30% of vehicles made in Thailand will become zero emission vehicles (ZEV). These situations become a challenge for oil and gas industry that the businesses may not be able to keep up with the trend and will consequently affect their revenue and long-term growth.

Nevertheless, the national policies and regulations may provide the opportunities for Thaioil Group to plan the business strategies. Particularly, if the government concretely provides supports or investment’s incentives in terms of clean energy production and consumption, such as hydrogen business.

Mitigation Measures



Closely monitoring the progress of regulatory enforcement.



Conducting Sensitivity Analysis for Carbon Pricing.



Joining membership of the greenhouse gas-related associations such as Thailand Carbon Neutral Network (TCNN) and Thailand Business Council for Sustainable Development (TBCSD) to monitor the regulatory enforcements and directions for the private sector.

Technological Risk and Opportunity

The technology advancement in alternative energy that can replace oil can be a factor that may affect future business direction. It may pose risks on technological readiness, efficiency, and safety in use, as well as production cost as it can be seen in the rapid technology development in utilizing alternative energy products, such as electric vehicles, hydrogen fuels, or carbon capture and storage technology.

Mitigation Measures



Conducting feasibility study for the use of carbon capture technology in the production process.



Participating in a feasibility study of applying carbon transportation and storage in the Eastern region with PTT Group.



Seeking business opportunities in carbon utilization for commercial use.



Seeking business opportunities in green hydrogen business.

Market Risk and Opportunity

Petroleum and petrochemical end-users' (Downstream) consumption behaviours in response to the low-carbon society and energy trends could be a consideration factor. The fluctuation of the crude oil price from crude oil suppliers (Upstream) could cause an uncertainty in business revenue. Besides, the trends of energy transition occurring in many countries may impact future markets while the growing demands of electric vehicles may disrupt the needs for oil and other fossil fuels.

Mitigation Measures



Adjusting gasoline production ratio in alignment with the decreasing demands in the future. Increasing the production efficiency of investing in diesel and aviation fuel production through Clean Fuel Project (CFP).



Conducting the feasibility study of biofuel.



Joining the feasibility study of sustainable aviation fuel with PTT Group.



Continuously engaging with customers to perceive their needs on future products and adjusting business's strategies towards high-value products.

Reputational Risk and Opportunity

The factors that may affect Thaioil Group deal with an insufficient action to mitigate climate-related impacts in response to the expectations of stakeholders such as societies, communities, employees, shareholders, and creditors.

Mitigation Measures



Declaring net zero GHG emissions commitment.



Planning and developing a net zero GHG emissions pathway.



Constantly communicating on the progress.

Result of financial impact assessment (EBITDA)

Type of risks:

- Carbon tax from carbon dioxide equivalent emission from the Company's production process. (Own Operation)
- Declining demands of the Company's products to the use of alternative energy. (Downstream)
- Carbon tax from the increasing crude oil price by crude oil suppliers. (Upstream)

Assessment timeframe:

- within 2030 and 2050
- Financial impact:** In case that the global situation is materializing as IEA's SDS prediction, the EBITDA of Thaioil Group will be approximately affected by 24% in 2030 and will reach 60% in 2050.



2. The Physical Scenario

Thaioil Group evaluated physical risks through scenario analysis in year 2030, 2040, and 2050 across the supply chain from upstream to downstream. The Company has conducted two scenarios analysis as follows:

- 01 The RCP 2.6 scenario represents a stringent greenhouse gas reduction measure.
- 02 The RCP 8.5 scenario represents a rapid increase in greenhouse gas emissions.

The physical risk involves the impact on water supply in the production process and investments in expansion projects, such as the Clean Fuel Project (CFP) and other future projects. This is due to the effects of climate change that may result in water shortages. On the other hand, future economic expansion is expected to increase water demand in the eastern region, particularly in eastern Thailand and the Eastern Economic Corridor (EEC). Thaioil Group recognizes the importance of being prepared to manage such risks to its operations, production, environment, and communities.

Thaioil Group has monitored and predicted water scarcity risks through water risk assessment, scenario analysis, and sensitivity analysis in situations where there are water shortages at various proportions within the production processes. The Enterprise Risk team regularly works together with Thaioil Group Water Management Working Committee to monitor such risks. The WRI Aqueduct Water Tools, an internationally recognized tool developed by the World Resource Institute, were adopted in the working processes. The Company also built a water management network with both government and non-government agencies, such as the PTT Group Water Committee in the Eastern region, Keyman Water War Room, and the Institute of Water and Environment for Sustainability (established under the Federation of Thai Industries), to create comprehensive water management and determine proactive measures. This helps reducing the potential risks in the production process and community as well as managing the risks in a timely manner.

To balance between business interests and stakeholders' expectations, Thaioil Group has agreed with government agencies to give importance to the community as the first priority during water shortages. This is to ensure the surrounding communities have adequate water irrigation for agriculture and consumption for their daily needs before any allocation to Thaioil Group. Furthermore, Thaioil Group has established a "Long-term Water Supply Strategy 2023–2033" to ensure water security and reduce the risk of water scarcity that may impact both business operations and future expansion projects. Thaioil Group's water management is summarized as follows:

At the present, Thaioil Group uses two types of water. The seawater is processed to freshwater through the desalination unit. The raw water is sourced from two different water distributors namely the Bang Phra Reservoir, which is operated by the Royal Irrigation Department, and the Nong Kho Reservoir, which is operated by the Eastern Water Resources Development and Management Public Company Limited. Both water distributors operate integrated water systems alongside Thaioil Group through aligning practices with government policies or the local context of shared water use in the area. This is to ensure adequate water supply within Thaioil Group's production processes, such as the cooling tower system, demineralization for steam production, and other production processes. The Company consistently improves and monitors water quality to exceed the required standards before discharging into the environment. To further minimize the impacts on the ecosystem, the circular economy and 3Rs

(Reduce, Reuse, Recycle) principles are adopted in water management to maximize the utilization efficiency (Please see more details on projects to reduce water consumption in 2022 in the Circular Economy chapter, page 60).

There are ongoing feasibility study projects under the "Long-term Water Supply Strategy 2023–2033" as follows:

- A study project on installing additional desalination units from six existing units. This project aims to increase the proportion of water consumption from seawater, which is considered an unlimited natural resource, to replace freshwater consumption, which is considered a limited natural resource.
- A study project on the recycled wastewater from the water treatment plant.
- A study project on reverse osmosis system for recycling wastewater.
- A study project on Pattaya wastewater recycle to reuse wastewater in the urban communities.

Moreover, there are completed projects that are now in the process of extending the contract as follows:

- A raw water utilization project from the private pond which has a high potential without any impacts on the water consumption of communities and farmers. This project aims to maximize resource consumption, diversify water supply management, and minimize water scarcity risks. Currently, this project is in the process of drafting the contract, which is expected to be completed by 2023.

Scenario Analysis Results: Physical risk

Type of risk: Droughts and cyclones

- Droughts: Water scarcity is the important factor for the business operations of Thaioil Group due to direct impact to the production processes. Therefore, water scarcity is considered the most significant risk.
- Cyclones: According to the forecasted cyclone data in the medium and long terms, the risks from cyclones are predicted to be very high. As a result, this indicates any cyclone event could have an impact on Thaioil Group due to the limited preparedness for responses.

Assessment timeframe: within 2030, 2040, and 2050

Financial impact: based on two scenarios:

- In the event of a drought, the following expenditures expected to be incurred per event:
 - In 2030, amounting to 561,567 to 764,319 THB.
 - In 2040, amounting to 557,769 to 764,319 THB.
- In the event of a cyclone, the following expenditures will be incurred per event:
 - In 2030, amounting to 236 to 240 million THB.
 - In 2040, amounting to 241 to 247 million THB.
 - In 2050, amounting to 249 to 258 million THB.

2022 Performance

To achieve Thaioil Group's net zero GHG emissions target, the Company strives to reduce the direct GHG emissions in the production process. The performance of Thaioil Group in 2022 is outlined as follows:

Reduction of Direct Greenhouse Gas Emissions (Scope 1)

Thaioil Group has implemented projects to decrease GHG emissions in production processes through the Energy Intensity Index (EII). The Company has invested approximately 13.14 million THB in 17 energy efficiency improvement projects, resulting in a reduction of over 16,759 tons of carbon dioxide equivalent (tCO₂e) in GHG emissions (Please see more details of the projects in 2022 in the Circular Economy chapter, page 60).

In addition, Thaioil Group has conducted a study on Life Cycle Assessment (LCA) of each product from Thaioil refinery to investigate the possibility of lowering GHG emissions at its source. Even though the LCA project, which uses the 2022 database, is currently underway and expected to be completed by 2023. Nonetheless, Thaioil Group also plans to expand the scope of study for the carbon footprint to every product within Thaioil Group.

Furthermore, Thaioil Group has implemented the renewable energy projects to support carbon neutrality target and participated in GHG emissions reduction activities with government agencies. This aims to support Thaioil Group's efforts to reduce GHG emissions and contribute to the national GHG emissions reduction targets. The completed activities are outlined as follows:



The Solar Rooftop for Sustainability Project

has been completed at the Engineering Building Center, Thaioil Sriracha Building, and laboratory. This supports the use of renewable energy and reduce GHG emissions. The total production capacity is approximately 1000 kW.



Thaioil Group has participated in the Thailand Voluntary Emission Reduction Program (T-VER)

organized by the Thailand Greenhouse Gas Management Organization (Public Organization) under the project "239-MW Combined Cycle Co-Generation Power Plant" at Sriracha District, Chonburi Province, of TOP SPP Company Limited. In 2022, the project passed the assessment and received certified carbon credits for the third year. The certified carbon credits were 356,863 tons of carbon dioxide equivalent (tCO₂e), and the accumulated carbon credits totalling 1,310,492 tons of carbon dioxide equivalent (tCO₂e).



The Low Emission Supporting Scheme (LESS) project

aims to enhance energy efficiency within Thaioil Group through energy conservation activities. The Company has selected five energy efficiency improvement projects under this scheme, including the optimization of the production process to increase energy efficiency in the C-1101 and C-1102A distillation towers at the CDU-2 distillation unit; the research on energy efficiency of the Sour Water Stripper Unit 2/5; the enhancement of energy efficiency at the Propane De-Asphalting (PDA) and Solvent Dewaxing Unit (SDU) by Hot LR from Thai Oil Public Company Limited; and the improvement of the energy efficiency in the Oil Separation Tower (C-58504) at the Detal-plus unit. As a result, these projects reduced GHG emissions by over 2,457.63 tons of carbon dioxide equivalent (tCO₂e).

With the GHG management described above, Thaioil Group has controlled methane emissions at the set target. A significant portion of methane emissions originates from the same source as the other greenhouse gases.

From the implementation of energy efficiency improvement projects in the production process in 2022, Thaioil Group was able to successfully achieve targets for GHG emissions (Scope 1 and 2), as outlined as follows:

2022 Performances

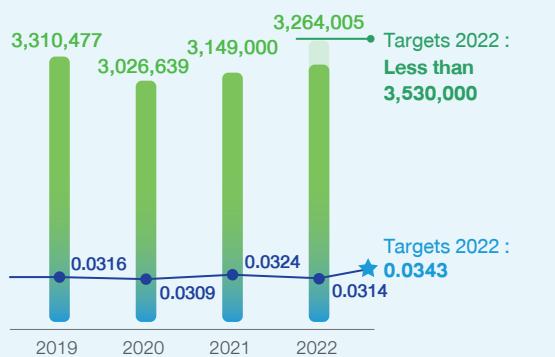


Natural Capital

Direct GHG emissions

■ Ton of carbon dioxide equivalents

● Ton of carbon dioxide equivalents per barrel of crude oil equivalents



Methane emissions

■ Ton

● Ton per million barrel of crude oil equivalents



Natural Capital

Reduced direct GHG emissions by

16,759

tons of carbon dioxide
equivalents (tCO₂e) from energy
efficiency improvement projects

Accumulated carbon
credits (2019-2022)
amounting to

1,310,492
tons of carbon dioxide
equivalents (tCO₂e)



Manufactured Capital

100%

of operations were
assessed for physical
climate risk

No

disruption
in production
process caused
by water scarcity

Reduction of Indirect Greenhouse Gas Emissions (Scope 2 and 3)

At present, Thaioil Group does not have indirect GHG emissions (Scope 2) that originate from the purchase of electricity or steam for consumption as the Company uses energy produced within Thaioil Group for internal consumption in the production process in the Si Racha District, Chonburi Province. Hence, the Company does not need to rely on external energy sources.

Other indirect GHG management (scope 3) from Thaioil Group's supply chain is summarized as follows:

- Sought opportunities to increase the value of waste disposed to landfill. The 3Rs method were adopted to control and reduce GHG emissions. In 2022, Thaioil Group successfully maintained zero waste to landfill performance against the set target.
- Established the Energy and Loss Committee (E&L Committee) to conduct risks assessment and develop strategies to

minimize ocean loss during the transportation. A product transportation system through a network of oil pipelines was designed by the Committee to reduce GHG emissions from the production sources to transportation by vehicles and tankers.

- Promoted the procurement of environmentally friendly products and services from partners. Moreover, the Company organized "Thaioil CE WE GO (Thaioil Circular Economy) project" to increase waste value through upcycling initiatives, such as upcycling plastic waste into QSHE shirts for employees and contractors, upcycling food waste into fertilizer, and others.
- Sold the low-carbon products to reduce downstream GHG emissions from gasohol, biodiesel, and bioethanol.

In 2022, Thaioil Group had 5 green product categories and 13 types of environmentally friendly products as follows:



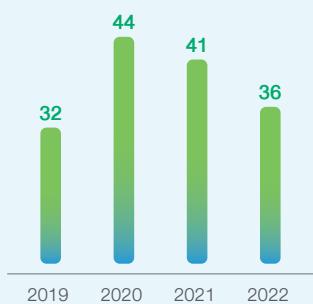
Green Product Category	Product Sold by Thaioil Group	Company	Sales Value (Million THB)	Sales Volume
 Products that use plants or agricultural outputs in replacement of petroleum (Bio-based products)	Ethanol from cassava		1,761.70	64.5 million liters
	Denatured ethanol (from corn)		2.80	60 tons
 Biodegradable Products	Linear Alkyl Benzene (LAB)		9,234	141,635.19 tons
	Heavy Alkyl Benzene (HAB)		152	1,937.6 tons
 Compostable Products	Cleaning products (KEEN)		0.60	3.2 tons
 Products that reduce emissions released to the environment (Emission reduction)	Benzene-free solvents, including: <ul style="list-style-type: none"> TOPSol BF: Benzene Free 		69.60	1,400 tons
	<ul style="list-style-type: none"> Xylene (Isomer): Low Ethylbenzene 		7.80	184 tons
	Solvents with low concentration of polycyclic aromatic hydrocarbons (TOPSol A 150 ND: Low PAHs)		41.20	600 tons
	Rubber oils (TDAE, TRAE, AROS) with PCA content below the international limit – thus non-carcinogenic and does not cause genetic mutation in humans		2,625	89,828.06 tons
	Low Sulfur Fuel Oil (LSFO or Fuel Oil IMO) with sulfur content at 0.5% or below		7,736	327 million liters
 Products with lower GHG emissions than products of the same group in the market (Avoided GHG emission products)	Cyclopentane CP80, an agent that can replace use of CFCs and HCFCs		17	220 tons
	Gasohol		51,325	1,576 million liters
	Biodiesel		112,259	3,980 million liters

2022 Performances



Financial Capital

Revenue share of green products to total sales revenue
(Percentage)



Financial Capital

Revenue share of avoided GHG emission products to total sales revenues
(Percentage)



Natural Capital

Sales volume of avoided GHG emission products
(Million Litres)



Natural Capital

Avoided GHG emissions by end users through lower carbon products

879,880 tons of carbon dioxide equivalents (tCO₂e)

Furthermore, Thaioil Group has implemented the community and environmental initiatives to promote sustainable natural resources and a low-carbon society. For instance, the renewable energy project was conducted under the “Sustainable Energy for Health Care” theme to install the solar power generation systems for governmental hospitals and those in the remote areas (Please see more details in the Corporate Social Responsibility, page 90).

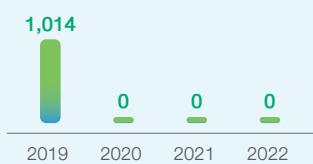
2022 Performance



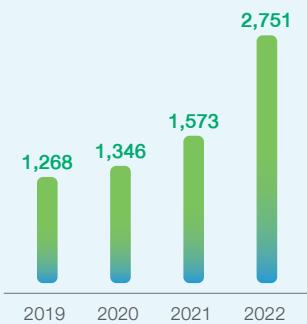
Natural Capital

The amount of indirect greenhouse gas emissions (Scope 3)

Supplier: Waste disposed to landfill
(tCO₂e)



Supplier: Ocean loss during marine transport
(tCO₂e)



Customer: Fuel products
(Million tCO₂e)





CIRCULAR ECONOMY



Challenges, Risks, and Impacts

The severe environmental situations caused by the growth of business and society have affected business, including limited natural resources, higher crude oil demands, limited sources of energy, petroleum, and petrochemical products, as well as impacts from increasing waste volume. With these significant challenges, Thaioil Group has managed and optimized its resources consumption to create sustainable and stable business growth.

Commitments and Targets

Thaioil Group strives to enhance environmental management to optimize the efficiency of resource consumption. The Company has established the Circular Economy Working Team to oversee the management of water, energy, environmentally friendly products and services, waste, and reuse optimization from upstream to downstream activities. Thaioil Group also integrated Circular Economy principles, in accordance with the international standard BS 8001:2017, into its sustainability strategy driving forwards circular economy under the environmental dimension. The Company also formed partnerships with the external stakeholders, such as governmental agencies, non-governmental agencies, and communities, in order to improve management efficiency, raise awareness, and provide values from Thaioil Group's operations back to the society.

Targets

Water consumption reduction

2022 Target

105

Million cubic meters per hour

Waste disposed to landfill

2022 Target

Zero

Long-term Target

2030 Zero

Waste disposed through 3Rs

2022 Target

95%

Long-term Target

2030 100%

Energy efficiency ranking of
Thai Oil Public Company Limited⁽¹⁾

2022 Target

**2nd
Quartile**

1st Quartile
Long-term target
after commissioning
of the CFP project

Procurement proportion of environmentally friendly materials,
equipment, and office supplies.

2022 Target

95% of total spending
the office supplies product category

Long-term Target 2026

98% of total spending
the office supplies product category

⁽¹⁾ Benchmarked the energy intensity index among other refinery businesses in the Asia-Pacific region, as ranked in the Solomon Benchmarking report

Management Approach

Thaioil Group determines its circular economy strategy as "Thaioil CE WE GO" and establishes a working team to drive the plan and implementation towards the set targets. The working team is responsible for framing, scoping, idea generation, feasibility studies, implementation, as well as monitoring and reporting. This aims to optimize resource

consumption across Thaioil Group's activities while also controlling and reducing the impacts of operations on ecosystems and communities in a sustainable manner. The working team regularly reports their performance to the management executives and stakeholders in the following four aspects:

Thaioil CE WE GO

Water and wastewater management	Energy conservation	Green label focus	Opportunity for upcycling
To focus on efficiency of water consumption both inside and outside the refinery. To study the feasibility of water discharge and seawater utilization.	To use energy resources wisely. To carry out projects for promoting the sustainable use of renewable energy both inside and outside the organization.	To set target of Green Label Product usage. To establish green procurement. To set Green Office / Green Meeting for sustainable management of office and meeting.	To sustainably manage waste. To carry out projects of waste upcycling for use in the organization's activities. To expand the Circular Economy project for communities and society.



W: Water and Wastewater Management

Integrated water management is one of the circular economy framework components. The 3Rs (Reduce, Reuse, Recycle) have been integrated across all dimensions of Thaioil Group's water consumption. Water management is supervised by the Water Management Committee, to increase water consumption efficiency from the origin to the end of production chain and reduce potential natural water risks.

In 2022, Thaioil Group has implemented several projects in three main areas as follows:

3Rs in Process - water management projects, including:

- A water consumption reduction project in U-2230 (APU-C) production unit.
- A water recovery project for TOPSPP power plant.
- A project to reduce backwashing in the side stream filters of Q-4707 and Q-85010A cooling towers.

- A maintenance project for leaking pipes.
- The 'Swop SWS-2 to SWS-5 (APU-C) to save LP stream' project is the one in which the Company will switch to operating Sour Water Stripper 5 to recover steam or condensates instead of Sour Water Stripper 2 to save LP steam.
- A backwash water recovery project from the filtration package.

Sustainable water management projects, including:

- The TOPSPP Blowdown Reverse Osmosis (RO) Project to filter blowdown water to freshwater.
- The continued operation of the desalination unit to increase the proportion of water consumption derived from renewable resources or seawater instead of freshwater from natural water source.



The 'Water Dashboard' development project

to closely monitor water consumption. This project can support efficient water management and effective respond to unanticipated changes in water conditions.



TOPSPP Blowdown
RO Project

Wastewater Management

Thaioil Group controls the quality of discharged water to the level required by regulatory requirements prior to releasing treated water from the operational areas. This resulted in a wastewater discharge volume reduction. Furthermore, Thaioil Group has designed the wastewater management system to efficiently optimize resource and energy consumption. The wastewater has been categorized into three types with different levels of contamination, as follows:

- Effluents from the operation process
- Continuously Oil-contaminated Water (COC): water used for washing or rainwater runoff at production sites.
- Accidentally Oil-contaminated Water (AOO): rainwater runoff in Thaioil Group's operational sites, water used for washing for areas without oil contamination, water used for fire drills, and water from cooling towers, or steam generators.

Each type of wastewater will be treated by Thaioil Group's wastewater treatment system, which operates 24 hours a day with constant monitoring of treated water quality. Also, the system directly reports the value of Chemical Oxygen Demand online (COD Online) to the Department of Industrial Works in a real time manner. The quality of wastewater is tested by Thaioil Group's laboratories and verified by external independent third parties to ensure that the quality of treated water is higher than the quality level required by the standards. In addition, the Company also emphasizes on human capital development through several activities, such as training operators overseeing wastewater treatment systems to increase capability in wastewater management efficiency. In 2022, Thaioil Group successfully maintained wastewater quality above regulatory requirements with no impacts on communities and ecosystems.

2022 Performances



Natural Capital

Freshwater consumption replaced by distilled water from desalination by

41%

Total net freshwater consumption decreased by

5.42%

compared to the previous year

Total water discharge increased by

3.56%

compared to the previous year

Total water consumption for industrial use

Million cubic meters
 Cubic meters per barrel of crude oil equivalents



Total net freshwater consumption

Million cubic meters
 Cubic meters per barrel of crude oil equivalents



Total water discharge

Million cubic meters
 Cubic meters per barrel of crude oil equivalents





E: Energy Conservation

Energy Management

Thaioil Group has determined Energy Intensity Index (EII) as one of the corporate key performance indicators (Corporate KPI) to demonstrate the importance of energy management. The Company also established the Energy and Loss Committee to drive energy performance. In 2022, Thaioil Group's energy consumption was approximately 47.34 million gigajoules, which was an increase of 0.33% compared to the previous year due to expansion of the production capacity in response to the growing demands on petroleum and petrochemicals upon the recovery of the COVID-19 pandemic. Nonetheless, Thaioil Group strives to implement energy conservation projects perpetually to improve energy efficiency at the production levels. In 2022, there were 17 energy efficiency improvement projects where the achieved result was 138,473 gigajoules reduction of energy consumption, equivalent to 16,756 tons of carbon dioxide, and 74.08 million THB of cost savings from the total of 13.14 million THB of investments.

The examples of Thaioil Group's energy efficiency improvement projects are:

- Temperature reduction of Sulfur Recovery Unit – 3: The temperature level was adjusted to be compatible with the feed inputs, allowing the reduction of energy used.
- Assessment of ammonia level in stripped water: The Company considered increasing the maximum limit of ammonia in stripped water (wastewater) that has been processed through Sour Water Stripper Unit 5, resulting in the reduction of the steam through the steam stripping approach.
- Process modification for heat utilization: The Company controlled excessive air volume in the heater of Hydrocraking Unit 2 by Hydrotreater Unit 2, and in the incinerators of LABIX Company Limited and lowered the temperature limit for the metal surface of the air pre-heater by maximizing the utilization of heat in exhausted gases, resulting in a reduction in energy usage.
- Soot equipment shutdown: The Company considered shutting down blowing equipment for soot generated from

burning high-sulfur fuel oil in the incinerator pipes of Thai Paraxylene Company Limited to reduce unnecessary steam usage. This is because the high-sulfur fuel oil is high-priced and cost-inefficient.

- Improvement of LABIX Company Limited's process for energy efficiency in the production units: The Company implemented various energy efficiency initiatives such as lowering the pressure in the distillation column for aromatic hydrocarbons with molecular structures (PEP Unit) to maintain it at the appropriate level. This results in the reduction of fuel consumption at the reboilers. In addition, the Company also increases energy efficiency at the prefractionation unit by lowering pressure based on the study results of the Production Capacity Expansion Project for Linear Alkyl Benzene (LAB) and the LABIX Debottleneck Project in 2021.
- Hydrogen utilization: The Company uses remaining hydrogen from the production process as a fuel with a natural gas that is usually burned at the gas flare tower to reduce the amount of natural gas needed in the production process and increase energy efficiency.

In 2022, the top two projects were the Sulfur Recovery Unit 3 temperature reduction project, which adjusted the temperature to the appropriate feed inputs, resulting in a fuel consumption reduction. Another project was the increase of maximum limit of ammonia in the stripped water (wastewater), processed through the Sour Water Stripper Unit 5, which resulted in a reduction in steam stripping. The working group, comprised of representatives from several departments, collaborated to perform research on key variables. Also, the minimum turndown capacity indicated in the design manual was considered for the findings analysis and conducting the risk assessment. The working group developed a handbook to test and modify the safe capacity while ensuring no disruption to the production process. These two projects have reduced 75,436 gigajoules of energy consumption, or 54.5% of the total energy savings, equivalent to 4,232 tons of carbon dioxide per year.



Thaioil Group organized a contest to encourage employee to share creative ideas to increase energy efficiency in the workplace.

Furthermore, Thaioil Group has implemented the energy conservation initiatives in the workplace. The Company supported and raised employees' awareness of the importance of energy conservation through various activities and communication channels. For instance, the Company organized a contest to encourage employees to share creative ideas to increase energy efficiency in the workplace, regularly share articles or news about energy conservation projects in the Energy and Loss column of the Company's Akanee monthly magazine, and place campaign announcements to promote energy conservation and tips on how to save energy in the public areas of the office.



The certificate of honor for participation in the Low Emission Support Scheme (LESS)

In 2022, Thaioil Group submitted five energy efficiency projects that were implemented in 2021 to the Low Emission Support Scheme (LESS) of the Thailand Greenhouse Gas Management Organization (TGO). As a result, the Company received a certificate of honor for the reduction of 2,457.632 tons of carbon dioxide equivalents.

2022 Performances



Financial Capital

74.08 million THB

in operational cost savings from investments in energy efficiency improvement projects.

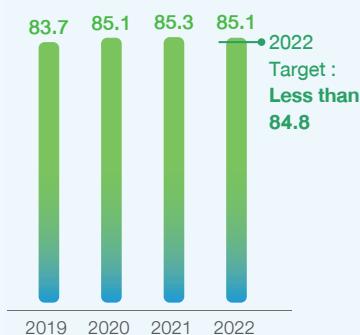


Natural Capital

138,473 gigajoules

of energy reduction from Thaioil Group's energy efficiency improvement projects implemented in the production processes.

Energy Intensity Index (TOP, TP, TOPSPP)



Energy Intensity Index (TLB)

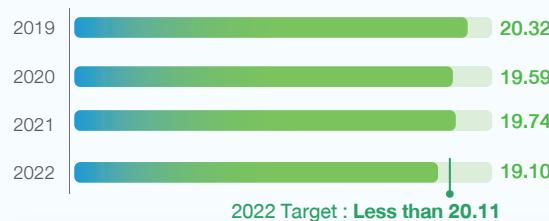


Energy Intensity Index (TPX)



Energy Intensity Index (LABIX)

(Gigajoule / ton of LAB)



Total non-renewable energy consumption

Megawatt-hour (MWh)



With an ongoing recovery of COVID-19 situations throughout 2022 and the lifting of lockdown measures across several countries, the overall demands of petroleum products have surged compared to the previous year resulting in the steadily increase of overall energy intensity. The success of the Company in energy efficiency was due to the close monitoring of the production processes, continuous process development and improvement, and challenging targets on energy intensity to drive the operations. Nonetheless, the stagnation of the market, particularly in the lube base oil and petrochemical businesses, has compelled Thaioil Group to cut its production capacity, resulting in lower energy efficiency than would ordinarily be the case. The Company also suspended some production units for maintenance, which limit the production capacity and increased the public utility and energy consumption during the maintenance. On reflection, the energy intensity index of Thai Oil Public Company Limited, Thai Lube Base Public

Company Limited, and Thai Paraxylene Company Limited were higher than the targets.

According to the Solomon Benchmarking report, Thai Oil Public Company Limited has maintained its energy efficiency in the 2nd Quartile in comparison with other companies in the Asia-Pacific region. The completion of the Clean Fuel Project will help Thaioil Group's refinery to reach the Top Quartile. In comparison to the other companies worldwide, Thai Lube Base Public Company Limited and Thai Paraxylene Company Limited have maintained energy efficiency level in the 1st Third and 1st Quartile, respectively.

Despite not having an energy efficiency benchmarking report, LABIX Company Limited has continuously implemented energy conservation projects and succeeded as planned. This resulted in the achievement of energy efficiency targets with clear improvements every year.



G: Green Label Focus

The behavioral change of consumer, industrial, and public sector, the purchase and promotion of environmentally friendly products and services have become more significant compared to the past. With an increasing attention to climate change and environmental impacts reduction, Thaioil Group adopts the environmentally friendly management or "Green Label Focus", which covers production, product utilization, procurement, and environmentally friendly services. This is supervised by working teams in relevant departments to ensure that targets are efficiently and sustainably achieved.

Promotion of Green Procurement

Thaioil Group manages the procurement and service by selecting material, equipment, and service, together with developing green products to reduce upstream waste and to increase efficiency of resource consumption. Since 2020, Thaioil Group has been certified by sustainable procurement or ISO 20400:2017 which was applied in all non-crude

procurements. Thaioil Group also promotes sustainable procurement across the supply chain through improving the Company's Procurement Policy and communicating with suppliers to build their readiness in the annual Thaioil Group Supplier Seminar.

For the procurement of materials, equipment, and office supplies; the purchase of environmentally friendly products (Green Products) is considered. This aims to motivate suppliers to develop their production processes for environmentally friendly products and reduce negative environmental impacts throughout the supply chain. In 2022, Thaioil Group's procurement of environmentally friendly products were 98%, which exceeds the target of 95% of total spending in this product category. Additionally, the total spending of green procurement in the new product category for the year 2022 has increased by 65% compared to 2021. In relation to this, Thaioil Group was able to avoid indirect greenhouse gas (Scope 3) of 1,472 tons of carbon dioxide equivalents.



2022 Performances



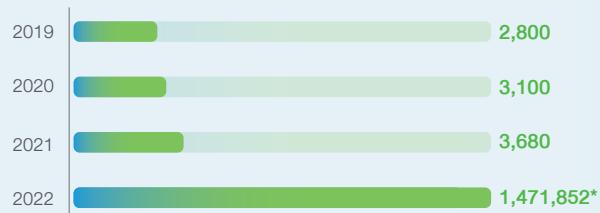
Financial Capital

The proportion of environmentally friendly materials, equipment, and office supplies procurement
(Percent of total spending on the office supplies product category)



Natural Capital

The amount of carbon emissions avoided from the use of environmentally friendly products
(Kilogram of CO₂ equivalents)



Remark* : In 2022, Thaioil Group rented environmentally friendly copying machine which significantly reduced the amount of carbon emissions compared with the traditional machine.
: Thaioil Group refers the carbon footprint of materials and products from the Pollution Control Department of Thailand.

O: Opportunities for Upcycling

Industrial Waste Management

Thaioil Group has made a commitment for an efficient resource management, seeking value optimization opportunities in waste recycling, and minimizing waste disposal in waste management. The Company aims to drive performance with the target of over 95% of waste management through the 3Rs (Reduce, Reuse, Recycle) in 2022, as well as maintaining the zero waste to landfill target that has been achieving since 2020. The circular economy and the 3Rs principles were applied throughout the production processes, from upstream to downstream. The Waste Management Committee drives and governs waste management towards the target.

In 2022, Thaioil Group has implemented projects across three main areas as follows:

CE in Process (Circularity in Process):

The Company controls and manages waste from the production processes through an operational excellence to minimize waste generated. For the waste generated in Thaioil Group, the 3Rs method is applied to manage and maximize the value of the waste. Examples of the initiatives are listed below:

- Adding value to spent catalysts through Platinum, Molybdenum, and Tungsten reclamation projects, which such elements can be utilized in other industries rather than being disposed of or incinerated. The platinum reclamation project was worth 33 tons of DeH-15 spent catalysts and 26 tons of I-300 spent catalysts.

- Meanwhile, the Molybdenum, and Tungsten reclamation projects generated 219 tons of HCU-1 spent catalysts, 218 tons of HCU-2 spent catalysts, and 43 tons of spent union fining catalysts.
- The Company took approximately 70 tons of UOP HC-115 spent catalysts, 243 tons of UOP HC-120 spent catalysts, and 55 tons of EM-1850 Olgone spent catalysts in the regeneration process to avoid disposal.
- The Company conducted a study on insulation recycling methods.

CE in Office (Circularity in Office):

to add value to waste generated in the offices and cafeterias. Examples of the ongoing projects are shown below:

- The Thaioil Group Zero Waste Project aims to raise awareness and provide knowledge for employees and contractors in waste separation and waste management.
- The Upcycling Plastic Waste Project aims to turn plastic bottles into QSHE shirts through upcycling methods. The shirts were then given to employees and contractors.

CE for Society (Circularity for Society):

The Company adds value to the waste by turning it into community products through ongoing projects as follows:

- A project to study the utilization of products from the operations regarding circular economy, such as fertilizers from food waste to fertilize trees at the Thaioil 60-Year Park, Nakorn Laem Chabang. On July 7th, 2022, the park was donated to the society for public purposes.
- The Company organized the Thaioil CE School Model Project to teach the youths about waste management processes, such as general waste management, the process of

composting waste to fertilizer, the way to recycle used oil, and basic accounting. This pilot project was conducted in two schools located in the Laem Chabang area, namely, Ban Chak Yai Chin School and Wat Ban Na School.

- Thaioil Group organized a “Circular Economy for Community” activity for elementary students at Wat Mai Nern Payom School, Si Racha, Chonburi.

2022 Performances



Natural Capital

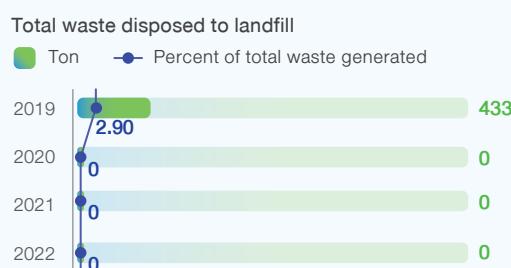
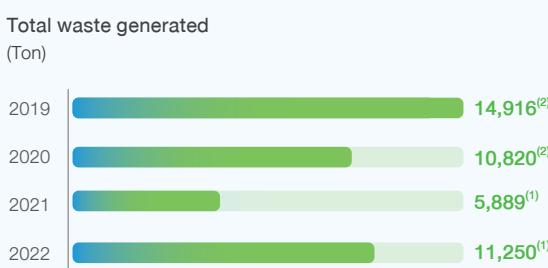
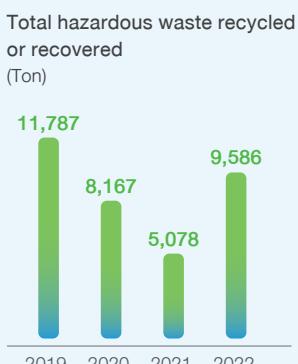
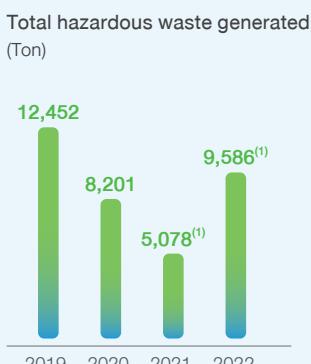
Total waste managed by 3Rs more than **95%** of total waste generated



Zero
waste disposed to landfill



No
indirect GHG emissions emitted from waste disposed to landfill



Remarks: (1) This includes the amount of waste remaining in the storage area at the end of the year.

(2) This includes waste from the demolition to prepare for construction for the expansion project.





Social Dimension

Empowering social engagement to collaboratively improve the quality of life, while being accountable for all stakeholders towards sustainable development

Thaioil Group is committed to enhance the quality of life for the communities and society through an excellent management of occupational health and safety for the employees and subcontractors. The commitment also aims to strengthen the capability of communities surrounding the refinery plant as well as the society at the national level in which the strategic areas include education, job creation, quality of life, public healthcare, and access to clean energy as well as strengthening relationships and quality of life for the wider society. Furthermore, Thaioil Group is committed to conduct business with respect to human rights throughout our value chain to ensure sustainable shared growth.



Human Rights



Human Health and Safety



Human and Organization Development



Maintaining social acceptance for long-term business operations

100%

of activities in business units have received the preliminary human rights risk assessment



Management of the occupational health and safety for employees and subcontractors

Safety performance was on par with the

Top 10%
in the oil and gas industry



Creating excellent human resource management and workforce productivity towards a high performing organization

89%

of employee engagement

100%

of individual development plans completed



Corporate Social Responsibility



Empowering community and social engagement along with advancing quality of life towards shared growth in the long-term



95.85%

of community engagement



This picture was taken from an actual location:
The 60th Year Anniversary Public Park,
Thaioil - Nakhon Laem Chabang



HUMAN RIGHTS



Challenges, Risks, and Impacts

The significant development on human rights occurred when the United Nations proclaimed the Universal Declaration on Human Rights 70 years ago, as a “universal” human rights framework. In 2017, The Royal Government of Thailand has declared the commitments on human rights as the national agenda through the development of the 4th National Human Rights Plan and the National Action Plan on Business and Human Rights. The 1st National Action Plan on Business and Human Rights (NAP) for 2019-2022 was published in 2019. Currently, the 2nd National Action Plan on Business and Human Rights for 2023-2027 is now under development. These developments, coupled with the impacts of COVID-19 pandemic, have certainly impacted Thaioil Group especially with risks that may lead to the human rights violations. For instance, employment and labour practices, migrant worker and forced labour, community rights during COVID-19 pandemic, employee engagement and inequality that affect employee security and mentality. By taking these potential risks into account, Thaioil Group has participated in the survey and hearing of the 2nd National Action Plan on Business and Human Rights and prioritize its human rights protection and prevention, to engage and response to the national policies.

Commitments and Targets

Thaioil Group has committed to respect human rights in operations across the value chain, as demonstrated in the Company's business operations. Thaioil Group has implemented the Human Rights Policy and the Thaioil Group Human Rights Impact Assessment and Management Procedure in 2015, which was updated in 2021 to align with the United Nations Guiding Principles on Business and Human Rights (UNGPs), the Core Conventions of the International Labour Organization (ILO), the United Nations Global Compact (UNGC), the International Finance Corporation (IFC), and the 1st National Action Plan on Business and Human Rights (NAP 1).

To manifest the commitments, Thaioil Group believes that although the government has the duty to protect and enforce human rights compliance, Thaioil Group also has the duties and responsibilities to comply with and respect for human rights, as well as play a key role in driving such respect across Thaioil Group's value chain. Therefore, Thaioil Group has developed tools and conducts human rights due diligence (HRDD) for business activities and suppliers in the value chain every 3 years with performance monitoring on an annual basis. The approach aligns with the International Finance Corporation (IFC)'s Guide to Human Rights Impact Assessment and Management, the UN frameworks, the Thailand's National Action Plan on Business and Human Rights (NAP Implementation), and the organizational risk management criteria. The approach has been clearly described in Thaioil Group Human Rights Impact Assessment and Management (HRIAM) Procedure.



The details of Thaioil Group's Human Rights Policy, Guideline, and the Thaioil Group Human Rights Impact Assessment and Management Procedure are disclosed on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=160&lang=en>

Targets

Thaioil Group must maintain zero human rights violation complaints.

Human rights violation complaints filed by the employees

2022
Target

Zero of complaints

2030

Long-term Target

Zero of complaints

Human rights violation complaints filed by the suppliers

2022
Target

Zero of complaints

2030

Long-term Target

Zero of complaints

Management Approach

Thaioil Group's Human Rights Impact Assessment and Management

Thaioil Group has conducted a comprehensive human rights risk assessment in line with the Company's human rights risk assessment principles and the international UN principles through the Thaioil Group Human Rights Impact Assessment and Management (HRIAM) procedure for human rights due diligence. Thaioil Group has comprehensively assessed human rights risks across its own business operations and suppliers in the Company's supply chain.

• Human Rights Risk Assessment in Thaioil's Operations 2022

All business operations, with a coverage of 100% of core business activities and other business function activities including joint ventures, have been assessed for human rights risks. The 2022 human rights risk assessment found that 38% of Thaioil Group's business activities had residual risks, with 100% of activities having risk mitigation measures.

The Scope of Human Rights Risk Assessment Conducted for Thaioil's Operations included:

- Refinery business (Thai Oil Public Company Limited)
- Petrochemical business (Thai Lube Base Public Company Limited, Thai Paraxylene Company Limited, LABIX Company Limited, Thaioil Solvent Company Limited, TOP Solvent Company Limited, and Sak Chaisidhi Company Limited)
- Power and Steam business (TOP SPP Company Limited)
- Supporting business (Thaioil Energy Service Company Limited and Thaioil Treasury Center Company Limited)

The Scope of Internal and External Stakeholders

included employees, business partners, customers, communities, as well as vulnerable groups, such as women, children, migrants, people with disabilities, elderly, people with illnesses, and LGBTIQ+.

Salient Human Rights Issues in 2022



• Human Rights Risk Assessment in the Supply Chain 2022

Thaioil Group conducted risk assessments on the Company's Tier-1 suppliers, covering 100% of the Tier-1 suppliers for crude oil procurement suppliers and general procurement suppliers. The assessment considered the severity and likelihood of each risk in accordance with the criteria of the Sustainable Code of Conduct for Supplier of Thaioil and Subsidiaries (SCOC). The 2022 assessment showed that 24% of all supplier activities had human rights risks. The key risks identified are working conditions and occupational health and safety. For all identified risks, the Company has implemented mitigation measures in place.

(Please see more details of the human rights risk assessment results and the HRAIM Report 2022 on the Company website)



2022 Performances



Social and Relationship Capital

100%

of business unit has conducted preliminary human rights risk assessment

100%

of Tier-1 supplier has conducted preliminary human rights risk assessment

100%

of the management executives, employees, and security personnel have been trained on human rights to build an understanding on the Company's policies and practices to prevent human rights violations in business operations and avoid involvement in any violation act of the suppliers in the value chain

Communications and Activities to Promote Human Rights

In 2022, Thaioil Group has continued to engage with stakeholders in human rights activities under the "3 Parts for Fulfilling Human Rights" framework for three consecutive years. The activities included:

Ensuring education for all: The Company provided knowledge and awareness on human rights for employees through the Human Rights E-Learning course in the "Thaioil Academy Application". For other stakeholders, the Company organized Human Rights Workshop for Thaioil Affiliate and continuously

hosted a human rights lecture for the suppliers (through Microsoft Team Live) during the SRM Seminar 2022.

Improving mental health care: The Company implemented the "5 Happiness the New Normal Work Life" initiative for employees to enhance understanding of their own rights, including employee care and benefits for employees and retired employees. The 5 Happiness Project consists of the following projects:

Digital Solutions for Happy Bodies and Good Health	Happy Hearts, Happy Energy	Happy Appreciation, Sharing Good Feelings	Happy Wealth, Flexible Benefits	Happy Societies Click! Anywhere
Proactively promotes employees' physical health through the Health Meter Application, an application that collects health data, assesses health risks, and provides health tips	Whether they be small or big problems, professional or personal stress, employees can set up appointments to consult with mental experts or psychiatrists can use the OOCA Application	Promotes a culture of appreciation in the organization through encouraging employees to send compliments, appreciation, and encouragement through the Admire Application, and together spreading positive energy and creating an enjoyable working environment	Employees can exchange certain benefits for reimbursements of products and services that better match their needs and personal lifestyles through the Flexible Benefits Application	Build a close virtual social relationships through the SAP JAM Application

Working with the right to health: Thaioil Group has managed and prevented the COVID-19 pandemic through the I – COVID Center. The Company enforced the policies and measures in line with governmental direction to prevent business interruption from the pandemic within the operational areas, and effectively gained the safety and trust of Thaioil Group's employees, contractors, suppliers, and other stakeholders.

Furthermore, Thaioil Group has implemented PEOPLE First for Employee Support Policy to meet employees' needs. The Company also provided supports to the employees and their families, as well as members of the Thaioil Group Retired

Employee Club, who may face the challenges in respect to financial concerns, legal issues, physical health, mental health, alcohol and drug problems, marital problems, illness of family members, or childcare problems, etc. The support was provided in a form of benefits, welfare, or non-welfare. This program aids eligible individuals 24 hours a day, seven day a week.

The details of the PEOPLE First for Employee Support Policy and COVID-19 prevention measures are disclosed on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=161&lang=en>



Good Labour Practice (Labour Rights and Equality)

Thaioil Group places importance in labour rights and equality. As the challenges, risks, and impacts of the COVID-19 pandemic occurred all over the world, this may lead to violations of human rights in various aspects. Thaioil Group has organized human rights' trainings, communications, and activities for the management executives and employees in order to increase understanding of the Company's policies and practices to prevent human rights violations in own operations and value chain. Moreover, to retain talents within the organization, Thaioil Group annually considered employee compensation and remuneration to ensure competitiveness with the industry peers and Thai companies. The consideration is also aligned with the Fair Treatment for Employees principle of Human Rights Policy in the Workplace, the Equal Pay Policy, the

Non-Discrimination and Anti-Harassment Policy, the Union Freedom of Association and Collective Bargaining, and the employment of people with disabilities procedures as specified by the government.

In 2022, 75% of Thai Oil PCL's employees are the members of the Thai Oil Refinery Workers' Union, according to the assessment processes of all business activities, with a record of zero protests and strikes.

Based on the aforementioned performance, the Company has had no significant labour conflicts in the past 60 years. Thaioil Group, therefore, received the "Role Model Organization on Human Rights" Award for large businesses for the third consecutive year.

2022 Performances



Gender Equality (Equal Employment Opportunity)

Total female employees
(per all employees)

2022
26%

**2026
Target**
25%

Total management positions held
by women

2022
41%

**2026
Target**
40%

Junior management⁽¹⁾ positions held
by women

2022
44%

**2026
Target**
45%

Top management⁽²⁾ positions held
by women

2022
33%

**2026
Target**
35%

Management positions in revenue-generating
functions held by women

2022
28%

**2026
Target**
35%

STEM⁽³⁾ related positions held
by women

2022
31%

**2026
Target**
35%

Remarks:

(1) Junior management includes Manager

(2) Top management includes Vice President upward

(3) STEM: Science, Technology, Engineering, and Mathematics



2022 Performances



Non-discrimination

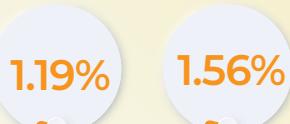
Buddhism



Employees

Management

Christianity



Employees

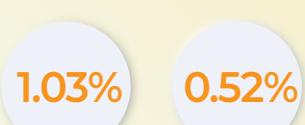
Management

Not Specified



Employees

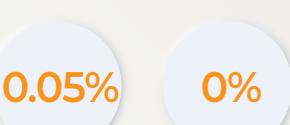
Islam



Employees

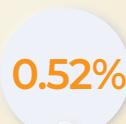
Management

Atheism



Employees

Management



Management

Good Community Practices (Community Rights)

Thaioil Group places great importance on engagement with communities surrounding its operational sites. The 3-Synchronization Principle is adopted to engage with the representatives from Thaioil Group, representatives from the surrounding 10 communities of the operation sites, and governmental agencies. In the meantime, the 5-Together Conceptual Framework is employed to assist the communities' strength and self-reliance. Community engagement is one of the communication channels used to update the construction progress of the Company's expansion project, and to obtain feedback and opinions from the community to collaboratively solve any issues that may arise. In 2022, Thaioil Group effectively managed community impacts through community engagement and created a good quality of life through projects and activities focusing on art and culture, healthcare, education, and the environment. Thaioil Group is aware of the community rights as part of human rights, which are important to the Company (Please see more details in the Corporate Social Responsibility chapter, page 90).

Furthermore, Thaioil Group has conducted Environmental Impact Assessment for all of the Company's major projects, developed mitigation measures, and received feedback from the communities as key stakeholders of the Company. In 2022, Thaioil Group organized community engagement activities through a variety of channels, including meetings with representatives of various groups such as the Community

Committee, Village Health Volunteers, Fishery Group, and Youth Group, as well as construction site visits with the communities and community visits around the construction projects.

Grievance Mechanisms

The purpose of Thaioil Group's grievance mechanisms is to receive and manage grievances from all stakeholders throughout Thaioil Group's value chain to minimize the social risks to business. The human rights grievance mechanisms are a designated process for the suppliers in the Company's supply chain to collect complainant data, respond to the concerns, and demonstrate transparency in the grievance and concern management process within Thaioil Group. This helps reduce potential conflicts and strengthen relationships with business partners.

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

Thaioil Group also has specific complaint channels for each stakeholder group to monitor and collect feedback. For suppliers, the complaint channels are provided on Thaioil Group's Supplier Relations website or srm@thaioilgroup.com.

Thaioil Group has designated a coordinating function to receive reports on incidents or complaints directly from the communities in the event that Thaioil Group's activities have affected the communities. The main tool for collaboration with the communities is the Voice of Stakeholders (VOS) Management System, which focuses on effective complaints resolution that may arise during both normal operations and construction expansion project. The Company also continuously communicates with the communities through online platforms and conducts community visits to build trust and understanding, as well as reduce community concerns, to ensure that Thaioil Group manages, maintains, and protects the rights of all stakeholders.



The details of the Grievance Mechanisms and Effective Remedy Framework Procedure are disclosed on the Company's website: https://www.thaioilgroup.com/upload/content_file/202106291600_202011131654_GrievancemechanismsandeffectiveRemedyFrameworkPROCEDURE20201.pdf

2022 Performances



Social and Relationship Capital

Zero

human rights violation complaint from employees

Zero

human rights violation complaint from suppliers

Zero

complaint on violations of labour practices, discrimination, and harassment across 100% of business activities

28 complaints

from the communities in 2022. According to the grievance mechanism procedure, the Company investigated and resolved the submitted complaints, established prevention measures, and notified the complainants of the results





HUMAN HEALTH AND SAFETY



Challenges, Risks, and Impacts

Since 2020, the COVID-19 pandemic continues to impact the people around the world, as such, people must adapt to the new normal lifestyle and working style. The situation has also affected refinery business model. In relation to the business plan, Thaioil Group is now expanding the production capacity through several projects, such as the Clean Fuel Project (CFP), of which is now under the construction. These has led to some challenges that require Thaioil Group to review and increase safety control measures to ensure business continuity without severe incidents that lead to business disruption.

Commitments and Targets

Thaioil Group has committed to establish the foundation of management systems for personal safety and process safety. The policies on quality, security, safety, occupational health, environment, and energy management were established to prevent, control, and reduce impacts that may occur in normal and abnormal operations, and emergency situations for both current and future business expansion. The Company also supports and protects suppliers from operational risks by considering relevant rules, regulations, and requirements.

Targets

No Harm No Leak Goal Zero

Safety Maturity Level

2022 Target
Reach maturity level **4**

2030 Long-term Target
Maturity level **4.5**

Total recordable work-related injury rate (TRIR) for all workers (employees and contractors)

2022 Target
Top **10%** of companies in oil and gas industry (by IOGP criteria)

2030 Long-term Target
0.10 cases per million hours worked

Process Safety Event (PSE) Tier 1

2022 Target
Zero incidents

2030 Long-term Target
Zero incidents

Management Approach

Employee Health and Safety Management

Thaioil Group manages occupational health and safety by establishing Quality, Security, Safety, Occupational Health, Environment, and Energy Management Policy (QSHE). The policy is used as the framework to achieve the TOP Group

QSHE Excellence 2019-2030 strategy. This will drive and strengthen Thaioil Group's potentiality towards QSHE excellence continuously and sustainably. The Company has integrated the management systems as follows:

1. Quality management system aligned with ISO 9001: 2016 standard
2. Environmental management system aligned with ISO 14001: 2016 standard
3. Occupational health and safety management system aligned with BS OSHAS 18001: 2011 standard
4. Occupational health and safety management system aligned with ISO 45001: 2018 standard
5. Integrated Management Systems (IMS)
6. Management system for the competence of testing laboratories (ISO/IEC 17025: 2018)
7. Corporate social responsibility standard aligned with ISO 26000 standard for CSR – DIW Project
8. Information security management system aligned with ISO/IEC 27001: 2013 standard
9. Energy management system aligned with ISO 50001: 2019 standard
10. Operational Excellence Management System (OEMS)
11. Process safety management system

At the present, Thaioil Group adheres to **the Operational Excellence to Business Excellence (O2Bx) strategy** with the goal to become a world-class refinery after commissioning of the CFP project. Safety is deemed to be one of the main pillars that must be developed and elevated. The All SAFE White Green Principles were adopted to develop and raise operational safety awareness and leadership. The definitions of All SAFE White Green are listed as follows:

All	All employees and contractors
S	Standard of works
A	Awareness on hazards and risk assessments
F	Full compliance on work standard with proper site supervision
E	Ensure continuous improvement
White	Drug free
Green	Environmental impact mitigation
No Harm	Organization without injury
No Leak	Free from leaks of hydrocarbons or hazardous chemicals from primary container

Thaioil Group implements the proactive strategy by elevating the management walk and talk activity to GEMBA Walk, which involves the management executives. The management executives inspect operations through conversations on the important activities with specific questions. This aims to create an understanding and to recommend safety practices in activities that may pose risks to personal safety and process safety. The QSHE Rollout activity has been persistently organized with a focus on providing more accessibility. In addition, the campaign to raise awareness about quality, security, safety, and the environment for workers in all operational areas has been expanded to include all operational areas and to encourage worker engagement. Thaioil Group has applied appropriate management systems to achieve the sustainable development. The performance of such activities is regularly reported to and discussed with the management executives for resolutions. Likewise, the annual management review is performed to determine improvement areas and develop annual plans, along with the regular communication with the employees to ensure the practices effectiveness.

Thaioil Group has a specific function to control and implement the work plan. The Company has established the Safety, Occupational Health, and Working Environment Committee, which more than 50% of the members are representatives of operational-level employees (excluding the committee chair). The committee requires at least one monthly meeting to share updates and monitor the progress of current performance and plans for future operations.

In 2022, the key performance of Thaioil Group on occupational health and safety are as follows:

Operational Excellence to Business Excellence (O2Bx) Strategy

- Adjusted the O2Bx strategy to become a world-class refinery after commissioning of the CFP project and reviewed the corporate safety targets to align with the new strategy – No Harm, No Leak, Goal Zero.
- Revisited the 5-year Occupational Health, Safety, Emergency and Crisis Management Plan to align with the internal and external environments, risks, the new strategic plans, and corporate targets.
- Assigned the management executives to present case studies and significant safety issues from both internal and external sources at the monthly Board Meeting to continuously develop and improve Company's safety measures.



- Organized an on-site visit with the CEO and President and the management executives during normal operations, maintenance downtime, and construction period to encourage the workers, demonstrate commitments on safe working conditions, and be the safety role model.

Occupational Health and Safety Risk Assessment

- Reviewed the identification and assessment of risks and hazards that may cause severe incidents. The Company determined the control and prevention measures, with constant monitoring for effectiveness. This also involved safety inspection, performance analysis, and provision of the corrective and preventive actions to avoid recurrence for employees and contractors. The safety performance was monthly reviewed and monitored by the management executives.
- Assessed risks and hazards with high severity and reviewed safety control and prevention measures. The proactive plans and measures on security and safety were established at different levels (defense in depth), covering all high severity risks and hazards, especially chemical spills. The emergency drill of each emergency level was conducted and further developed towards the crisis management level together with external parties and local governments. This helps in the prevention and mitigation of business impacts, as well as the ability of Thaioil Group to manage and maintain severe risks at acceptable levels at all times.
- Reviewed the major accident event profiles to be aligned with the risks. The Company also reviewed and conducted a test on the emergency and crisis drills, and the emergency response plan according to the international best practices. Moreover, the Emergency Control Center was improved to be up-to-date and more efficient.
- Reviewed the practices on accident and incident management to cover every type of incidents; namely, work-related injuries, occupational illnesses, near-miss events, and other incidents including incidents in production processes. The Company also conducted severity and risk assessment through the Risk Assessment Matrix to select the appropriate investigating team and methods for the severity and risk level of each incident. To avoid recurrence, the root cause and appropriate preventative measures were identified.

Safety Management Improvements

- Reviewed Permit to Work System, especially the work permits related to heat and ignition (Hot Work). All relevant checklists were also reviewed to ensure alignment with the international best practices.
- Conducted safety maturity assessment. In 2022, the Company was rated at 4.13 out of 5.00 points. Thaioil Group has prepared the Safety Culture Development Plan to build awareness for employees and contractors towards the accident-free organization.
- Reviewed Permit to Work Inspection by the Area Operation Officers and Safety Audit team to ensure that the practices are aligned with the requirements specified in the permits.
- Developed a Simultaneous Operation Procedure for enhanced risk management in two or more overlapping tasks that occur at the same time and in the same area. The procedure was implemented to control the risks and hazards in the overlapping activities during normal operations, construction, and maintenance to maximize safety.
- Conducted the evaluation of Health Performance Indicators based on the standards of International Association of Oil and Gas Producers (IOGP). In 2022, the Company scored 3.82 out of a total of 4.00 points. The Company commits to improve the development plan for management systems in line with criteria and requirements of the IOGP.
- Enhanced contractor safety management to align with the international best practices and conducted annual contractor safety performance evaluation by the third party. The evaluation covered safety management system and operational performance to classify the contractor. The contractor banding can be categorized by color code, including green, yellow, and red, to be used as the criteria for deciding whether the Company should continue doing business with contractors or not. In the case that the contractors categorized in the low level (yellow and red), the Company will allow them to present plans and corrective actions to remedy the issues identified to comply with requirements within a specific timeframe.
- Developed the Electronic Contractor Safety Passport to record individual and corporate contractor profiles and safety data. The data will be used for safety management and the annual performance evaluation of the contractors.

- Reviewed safety practices for activities or tasks with accident risks, such as heavy lifting with crane, scaffolding, or electric device utilizing within the refinery area. The Company also conducted training and communicated to relevant employees and contractors to ensure compliance with the requirements.
- Upgraded notification systems on abnormal or emergency situations for emergency personnel and relevant officers through SMS systems that will promptly notify relevant parties to provide the emergency response efficiently and on a timely manner.
- Conducted ergonomic assessment for a sample group of employees and contractors working in the office areas, maintenance facilities, warehouse and supplies, and testing laboratories. This will assess health behaviors and threats for appropriate prevention measures determination for such activities and risks.
- Organized All SAFE White Green MTA (Major Turnaround) Project during an annual maintenance downtime in 2022 to build awareness for employees and contractors and to minimize risks in maintenance activities.
- Reviewed Pre-Incident Plan at levels 1 and 2 to align with the international situations and standards, conducted drills as planned to prepare an effective response in emergency situations.
- Provided Quick Attack Vehicle (QAV) fire trucks with a fire pump rate of 1,000 gallons per minute (GPM) for effective and safe preliminary responses.
- Provided big gun with a fire pump rate of 6,000 GPM for extinguishing fires in large oil tanks with diameters greater than 60 inches.
- Organized the “30-60-90 Days with No Harm No Leak” to strongly emphasize and simulate employees and contractors to raise awareness on safety in the workplace. The goal is to achieve zero Medical Treatment Case (MTC).
- Organized Thaioil Group QSHE Day 2022 to promote the safety culture for the employees and contractors by awarding and certifying those who have outstanding 2022 QSHE performance. The Company also organized exhibition booths to provide employees and contractors with safety knowledge and awareness.
- Raised awareness of potential hazards such as the line of fire and ensure compliance with the 12 life-saving rules. The Company also encouraged workers to write Potential Incident Report (PIR), emphasizing the significance of unsafe act and condition as specified in the pre-incident prevention measure.
- Conducted training and knowledge sharing on safety, occupational health, and workplace environment for new employees and contractors. This aims to build awareness of basic risks and hazards in Thaioil Group's operational areas, to recognize and understand the safety measures, and to mitigate risks in operations. This includes basic safety in refinery, basic firefighting, safety in confined space, and first aid.
- Conducted specific safety knowledge training for employees and contractors to improve operational effectiveness, ensure safety, and compliance with the requirements. For instance, Authorized Engineer/Authorized Gas Safety Inspector (AE/AGSI) course, Clearance Certificate Signatory course, Authorized Gas Tester course, and electric safety course.

Safety Knowledge Sharing and Engagement

- Established a safety training center to provide knowledge on safety theory and practice to enhance knowledge, capability, and skills of employees and contractors.
- Developed and assessed the capability of the employees and contractors who performed tasks related to safety and had a continuous Permit to Work System from the previous year. The emergency and crisis management based on the assigned roles were assessed through the Competency Assurance System.

The Responses to COVID-19 Pandemic Situation

- Implemented the COVID-19 surveillance plan, including 3 phases. In Phase 0, or no infected cases, the prevention and surveillance measure will be emphasized. Phase 1 begins when there are suspected or infected cases in Thaioil Group but no impacts on business operations. The Company will then focus on controlling and limiting the spread of the virus. In Phase 2, the large number of infected cases in Thaioil Group and creating impacts on business operations. In this case, Thaioil Group will focus on relieving and recovering while the Emergency Control and Business Continuity Center will be activated.



2022 Performances

Work-related fatalities



Employee
Zero case



Contractor
Zero case



Occupational Illness Frequency Rate
(OIFR) of employees and contractors
Zero case

Total Recordable Injury Frequency Rate (TRIFR) of employees and contractors

0.34 cases

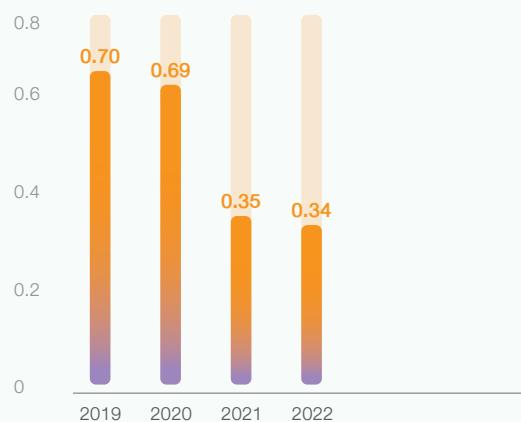
per million hours worked

Exceeded the target of 0.30
case per million hours worked

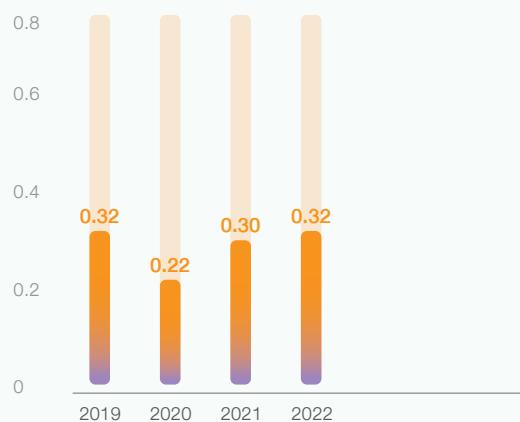
Thaioil Group's safety performance
was on par with the top

10% of companies in oil
and gas industry (by IOGP criteria)

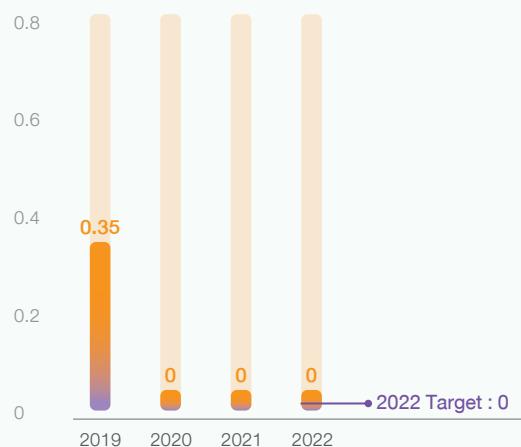
Total Recordable Injury Frequency Rate (TRIFR) of employees
case per million hours worked



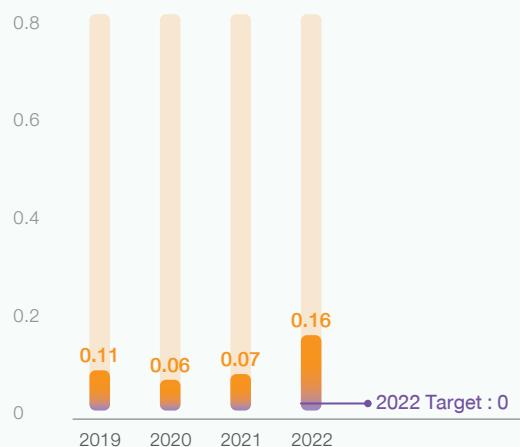
Total Recordable Injury Frequency Rate (TRIFR) of contractors
case per million hours worked



Lost-Time Injury Frequency Rate (LTIFR) of employees
case per million hours worked



Lost-Time Injury Frequency Rate (LTIFR) of contractors
case per million hours worked



Process Safety Management System

Process safety is one of the components in the Safety Pillar identified in strategic plans towards business excellence that requires continuous development and improvement. The main goal is to maintain business continuity without a Loss of Primary Containment (LOPC) or Process Safety Event (PSE) that could result in fatalities, asset loss, environmental impacts, and reputational damage. Thus, the Process Safety Management (PSM) has become a key success that drives and strengthens the capability of the Company to achieve the No Harm, No Leak, Goal Zero target and excellent and world-class process safety performance.

Since 2018, the Company has established the Technical Safety Function to develop and improve process safety management to meet the international standards of the Occupational Safety and Health Administration (OSHA). The proactive risk management is emphasized to prevent severe incidents. This allows Thaioil Group to conduct sustainable business and become a safe organization throughout the value chain.

In 2022, Thaioil Group implemented process safety activities in accordance with international standards and best practices as follows:

- Reviewed the current status of process safety management against the OSHA standard and international best practices.
- Reviewed the 5-year process safety plan to develop and improve process safety management system in alignment with the international best practices.
- Reviewed and improved Safety Critical Equipment (SCE) to be aligned with Mechanical Integrity requirements, as one of the components of the PSM.
- Improved the Management of Change (MOC) in the production process to be aligned with the international best practices. This helps preventing the incidents and reducing the impacts that may arise from changes or adjustments of production process. The Company reviewed other aspects such as risk analysis, prevention measures, and engineering design. Also, the technical reviews were conducted by specialists before the improvement. After the improvement, the mechanism will be tested before an actual operation. Furthermore, the Company determined both proactive and reactive MOC KPIs. The steering committee and operational committee were established to drive and support the Company to achieve the set targets.
- Reviewed risks and control and prevention measures for severe hazards that may occur in the production processes, such as product tank, incinerators, wastewater treatment unit, or single-point moorings (SBM 1 and 2) through Hazard Effect Management Process (HEMP). This ensures the efficiency and effectiveness of the designed preventive measures or installed safety equipment that can control risks to an acceptable level at all times.
- Developed and improved the Technical Authority (TA) System in accordance with the international best practices and adopted the MOC process. The purpose is to ensure that every change that occurs in the manufacturing process is systematically reviewed and approved by technical experts. Also, the functions related to such changes can work safely and sustainably. In 2022, the Company conducted the TA training and knowledge & skills assessment of TA at all levels (TA0, TA1, TA2, and TA3).
- Strengthened process safety awareness through 10 Process Safety Fundamentals and Process Safety Management and Barrier Thinking. Moreover, the management executives conducted a site visit or “GEMBA Walk” to inspect key activities by making conversations with specific questions. This focuses on providing recommendations and creating understanding of the activities that pose personal and process risks.
- Inspected process safety through designated inspection plans and checklists, reporting, monitoring and corrective actions, and systematic performance analysis.
- Developed Process Safety Competency Development Matrix as the approach of the Community of Expert (COE), which covers key roles in process safety management. In addition, the Company conducted training and knowledge & capability assessment through determined criteria. This ensures that the employees are equipped with process safety knowledge, competency, and skills that are suitable for their assigned roles, leading to the excellence in sustainable process safety performance.
- Developed and improved the Pre-Startup Safety Review (PSSR) process, including the safety protocol and PSSR checklist, to align with the international best practices and to build readiness for the Clean Fuel Project.
- Encouraged the employees and contractors to learn from an incident and the international best practices. The acquired knowledge will then be reviewed and applied to improve the process safety and emergency incident management of the



Company. This will prevent severe incidents and enhance organizational emergency and crisis management to reach international standards.

- Raised awareness and prevented hydrocarbon or hazardous chemical leakage from main containers, or Loss of Primary Containment (LOPC) Prevention. The Company reviewed and enhanced management process and LOPC chain to cover reporting, investigating, analyzing, and learning from previous LOPC incidents. Proactive management and prevention, such as Corrosion Under Insulation inspection, Flange assurance, and Gasket control, were also revisited. Moreover, the Company established the steering committee to drive and support the LOPC Prevention Project towards achieving the safety targets.

- Organized Reliability Walkabout Campaign to raise awareness for operational workers. The campaign focused on finding the potential source or equipment that may have a leakage of inflammable or chemical substances in primary containment or production processes (LOPC).
- Determined process safety indicators, including both leading and lagging indicators, in accordance with the American Petroleum Institute Recommended Practice 754 (API RP 754). The recording and monitoring of High Potential Incident (HPI) were additionally conducted by focusing on root cause investigation, incident prevention, learning promotion, and effective awareness creation. The Company's process safety performance is reviewed by the management executives on a weekly basis.

2022 Performance



Process Safety Events – Tier 1
in accordance with API 754



In 2022, there was one case of inflammable or chemical substances from primary containment or production process that resulted in severe impact in accordance with API 754, accounted for 0.05 events per million hours worked. The outcome fell short of the 2022 target of zero events per million hours worked. Thaioil Group has investigated the root causes of incidents to resolve them and prevent future occurrences. The result of the investigation demonstrated that the detection system and responsible authorities could detect the event at its origin and quickly bringing it under control. Therefore, the production process was not interrupted.





HUMAN CAPITAL DEVELOPMENT



Challenges, Risks, and Impacts

Thaioil Group's strategy focuses on business expansion from the petroleum business to other businesses in both domestic and international markets such as the petrochemical and power businesses. For this reason, the Company needs high-potential human capital to prepare for steering both the current businesses and new businesses in the future.

With the same situation to the other organizations worldwide, Thaioil Group not only had to face with the business challenges but also human and organizational challenges that occurred for various reasons. For example, the COVID-19 pandemic affected the learning equality of the employees. The Company has therefore established a strategic plan to maintain learning equality for employees by providing learning courses via online platforms. The pandemic also altered the way of how businesses operate and the expectations of the new-generation employees. These are significant challenges that Thaioil Group needs to consider and enhance the strategic plan for human resources and organizational development.

Commitments and Targets

Thaioil Group always recognizes that the core of the organization is the 'People'. The Company places the greatest importance on employees with the "People First" commitment. Therefore, the "Business 5 Year Master Plan" clearly addresses the strategy for human resources and organizational development driving forwards the company towards sustainable growth. The strategy covers three dimensions as follows:

People Capacity

Thaioil Group prioritizes the strategic workforce planning and the recruitment of employees to support business strategy and business expansion at each stage and to maintain a competitive workforce in comparison to the industry peers.

People Capability

Thaioil Group strives for the human capital development to drive business through employee's expertise and business knowledge readiness. This aims to support career growth and internal knowledge management to retain organizational knowledge that adds business value to the Company.

People Experience

Thaioil Group strives to enhance quality of life and create valuable work experiences in alignment with a new way of working to improve employee satisfaction and engagement. This contributes to Thaioil Group's status as "The Best Employer".

Furthermore, Thaioil Group has applied digital technologies throughout the organizational systems to enhance human resources and organizational development, increase efficiency, and build positive experiences for employees.

Targets

Workforce Planning:
Workforce productivity
in comparison with
industry peers

**2022
Target**

1st Quartile

**2030
Long-term Target**

1st Quartile

Human Capital
Development:
Readiness of
core competency

**2022
Target**

95%

**2030
Long-term Target**

95%

Creating a positive
employee experience:
Employee engagement

**2022
Target**

94%

**2030
Long-term Target**

95%

Human Capital
Index (HCI)

**2022
Target**

79 Score

**2030
Long-term Target**

85 Score

Management Approach

Thaioil Group has analyzed its internal and external environments to address challenges, risks, and impacts, as well as requirement on human resources and organization. The Company has established the short-term and long-term strategic plans to drive the Company's strategies to sustainably achieve the set targets. The key performances of 2022 are outlined as below:



Strategic Workforce Planning and Recruitment

Thaioil Group prioritizes strategic workforce planning in line with the business strategies and directions to maintain a competitive workforce in comparison to the industry peers. The Company also focuses on proactive recruitment and hiring through the "WINS Forward" strategy, which enhances workforce planning in three areas as follows:

1 Workforce Acquisition

The Company analyzes workforce requirements and effective recruitment channels to recruit adequate workforces in response to the business needs.

2 ITOP+ Selected Candidate

The Company develops the tools to assess candidates' value to select candidates who possess values in line with the Company's values.

3 New User Experience Platform

The Company enhances recruitment and hiring processes by applying digital technologies throughout the process in order to increase the effectiveness on recruitment and hiring, including creating positive experiences for candidates.

2022 Performances



Human Capital

Ability to recruit employees
in desired positions

92%

New hires

99

new employees



Social and Relationship Capital

Provided scholarship to

95 students

from 33 academic institutions

Provided internship opportunities to

78 students

from 23 academic institutions

Workforce productivity level
in the

1st Quartile

in comparison with industry peers

Shared knowledge and
career advice to students at

46

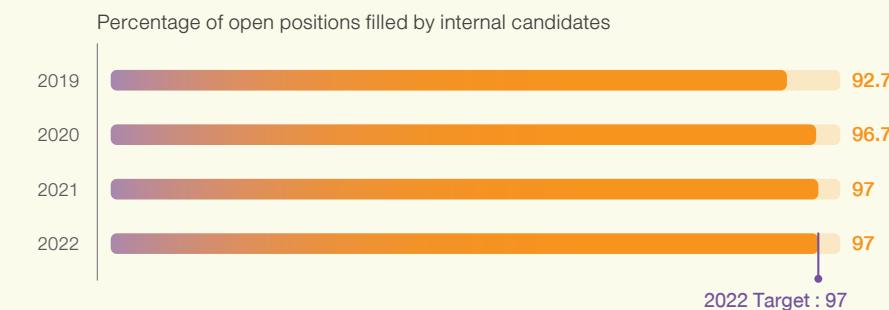
academic institutions



2022 Performances



Human Capital



Internal Hire



Human Capital Development

Thaioil Group believes that people are the important part that contributes to a long-term growth. Therefore, the Company recognizes the importance of human capital development to ensure readiness in driving key organizational strategies in three areas – Value Maximization: Integrated Crude to Chemicals, Value Enhancement: Integrated Value Chain Management, and Value Diversifications. Thaioil Group provides self-learning opportunities for employees through Thaioil Academy, the digital learning platform that allows employees to select courses for their work-related development

and encourages employees to share and exchange knowledge through the platform.

Moreover, the Company aims to build employee competency through the Accelerator Program, which focuses on knowledge exchange and practical experience based on the 70-20-10 principle. This initiative provides employees with an in-depth knowledge and understanding, preparing them for work, and producing excellent performance that result in value creation and business benefits.

Course	Development Approach	Benefits Created
Core Competency	Training, knowledge exchange with the experts, and practical experiences	Employees are taught on data analytics, cyber security, and digital transformation. Employees were also given the opportunities to safely use technologies related to their work and to apply knowledge on digital technology, such as UX & UI development, cyber security awareness, and digital transformation towards sustainability, to enhance their work efficiency.
Innovation	Knowledge exchange with the experts, and practical experiences	Employees are provided with the lessons on the principle of building organizational innovation and innovation excellence from leading companies. This allows employees take the lesson learned to invent and identify ways to increase effectiveness in their daily work. Finally, employees are provided with the opportunities to present their ideas and work through Innovation Awards to drive the organization towards an innovative organization.
Expert Development Enhancement	Knowledge exchange with the experts and hand-on practical experience through projects and on-site work	The enhancement of skills, strength, and in-depth work expertise for employees to utilize their knowledge into practice and develop them into experts. This helps with retaining significant knowledge, such as distillation and process control development, hydro processing of renewable feedstocks, and downstream hydrocarbon workshops, within the organization.

Course	Development Approach	Benefits Created
International Business Development	Training, knowledge exchange with the experts, and practical experiences	This course aims to develop employees' knowledge, skills, and readiness for the international businesses in diverse areas. The contents involve international business acumen, cross-cultural management, and building business networking and partnerships. This aims to prepare employees for international work and seek business opportunities to support Thaioil Group's three key business strategies and drive the Company towards sustainable growth.

Thaioil Group continuously develops leadership potential through the Alpha Leader Club initiative to stimulate knowledge exchange between the leaders and external experts, which includes "enhances leadership" and encourages leaders to have "comprehensive healthcare". This is to prepare them for the changes and effectively manage their teams under complicated circumstances.



 Enhancing leadership to be GREAT Leader	 Goal Achievement Determine goals and work plans that align with the Company's direction.	 Comprehensive Healthcare for Leaders Support emotional health by well-managing their own emotions, and properly handle others' emotions.
 Relationship and Result Understand roles and build capability and relationship for the team.	 Expert and Execution Having knowledge and expertise for assigned tasks and being able to effectively make a decision based on the data and information available to them.	 Intellectual Promote intellectual health through self-learning.
 Attribute Understand stakeholder needs and appropriately fulfil those needs.	 Transformation and Change Motivate innovation creation within the business unit and encourage changes.	 Environment Support healthy environment to build good and healthy working atmosphere in the workplace.
 Emotional Promote social health and build a trusting society where employees can work together happily.	 Physical Promote physical healthcare to avoid diseases and live happily.	



As a result of the continuous employee development in 2022, employees received an average of 316 hours of development and training per full time equivalent (FTE) with 589 million THB of investments responding to the business expansion and preparation for future challenges.



Thaioil Group recognizes the importance of career development. The Company has created career development plans for subject matter experts, technical experts (Technical Centre of Excellence), and sandbox explorers to equip employees with knowledge, capability, and experience that will help them steadily grow on their career paths.

Moreover, Thaioil Group has committed to increasing competitive capability and business growth through becoming a learning organization. The Company created a long-term master plan to enhance five areas of learning organization and has communicated to all employees with a goal to raise awareness and encourage each business function to identify and secure important knowledge, as well as apply their knowledge to improve their work processes.

5 Areas of Becoming a Learning Organization

Goal & Strategy	Organization Transformation	Strategic Knowledge Management	People Dynamic Learning	Learning Ecosystem
A clear goal and strategy to become a learning organization that aligns with business strategies.	Policy, organizational structure, roles, and processes that support learning.	Effective systems and knowledge management processes.	Learning culture that aligns with becoming a learning organization.	Learning technologies and platforms that support and build learning society.

2022 Performance



Intellectual Capital



Learning organization assessment resulted at

75% (Level 4: Integrated⁽¹⁾)

based on employee assessment. The assessment was developed upon domestic and international best practices with the external consultants



425

online courses created by employees' knowledge and expertise



134

knowledge developed through knowledge exchange between employees through Knowledge Management (KM) Projects



Human Capital



Average training hours of

316

hours per FTE⁽²⁾



80

Human Capital Index (HCI) Score



75%

of employee readiness based on employee competency assessment.



Financial Capital



Average employee development cost of

296,488

THB per FTE⁽²⁾

Remarks:

(1) Integrated level means that the Organization is becoming a learning organization through the development of learning necessities. However, there are still gaps for improvements.

(2) FTE or Full Time Equivalent is the number of working hours per a full-time employee per year.



Building a Positive Employee Experience

Thaioil Group prioritizes employee opinions and suggestions from all communication channels including direct communication with the management executives, ongoing conversations between supervisors and employees, and an

annual employee engagement survey. Findings will then be processed through an in-depth analysis in order to support the development of employee well-being, satisfaction, and engagement from the first day of employment to their retirement.

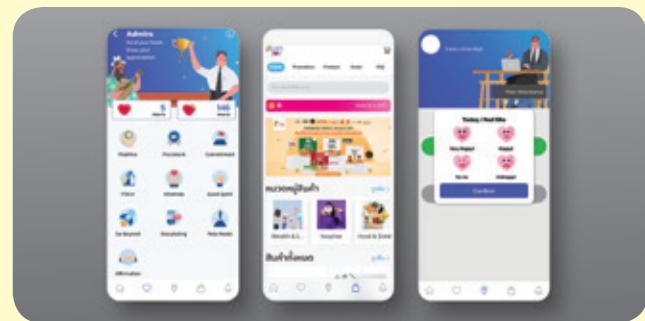
Through PEOPLE Model, Thaioil Group continuously organizes activities at the organizational level to enhance employee engagement by encouraging supervisors to design activities that fit the needs of their team. This helps Thaioil Group

responding to the employee needs and expectations while taking care of the employees, who are one of the most important parts of the Company. This results in stronger relationships and increased employee engagement.



In 2022, Thaioil Group has delivered happiness and good experience to the employees through the "Five Happiness" project, consisting of: Happy Bodies; Happy Heart; Happy Wealth; Happy Networking; and Happy Appreciation. The Company has also developed "Joyful the Series", an integrated health and well-being enhancing program to promote knowledge for employees to take care of their own health, as well as the "Spark Joy" application that provides various functions to enhance working efficiency.

Furthermore, Thaioil Group promoted and supported communication for mutual understanding between supervisors and employees in their team. The Company also enhances supervisors' understanding of the performance management system to ensure standardized practices with clear and transparent communications.



Please see more details of Thaioil Group's Performance Management System on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=161&lang=en>

2022 Performance



Human Capital

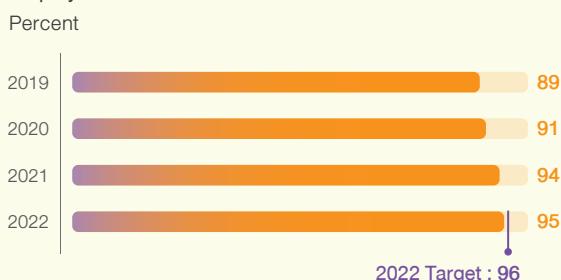
Employee received performance reviews



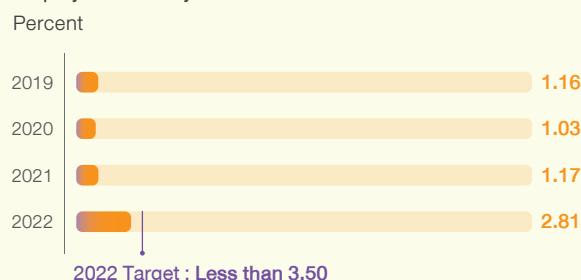
Employee engagement rate



Employee satisfaction rate



Employee voluntary turnover rate





CORPORATE SOCIAL RESPONSIBILITY



Challenges, Risks, and Impacts

The significant progress of construction of the Clean Fuel Project (CFP) in 2022 has become one of the corporate social responsibility challenges for the communities and society. Thaioil Group not only has to prevent potential impacts on the rights and safety of the people surrounding the project but must continue to complete the construction of the project. To develop the quality of life and economy of the communities, the Company has implemented the projects for enhancing the quality of the communities' lives and well-being. This will not only protect community livelihoods, but it also maintains a stable corporate presence and enables to operate with resilience and flexibility. In this year, Thaioil Group has operated community projects under the ESG strategic framework to maintain internal management stability and control community impacts, particularly in communities surrounding the CFP project and operational sites.

Commitments and Targets

Thaioil Group commits to building community engagements in accordance with the 2030 vision of "Empowering Human Life Through Sustainable Energy and Chemicals". The Company conducts a petroleum and petrochemical refinery business under a framework of management excellence and in compliance with the principles of good governance, while also upholding responsibility towards stakeholders, environment, communities, and society to drive the Company towards sustainable development.

In 2022, Thaioil Group established integrated community development plans through projects and initiatives in the society and culture, the health and quality of life, the education, and the environment. Furthermore, Thaioil Group has committed to develop community, social, and environmental goals in line with the Company's vision. To achieve this, Thaioil Group has adopted social return on investment (SROI) concept to assess the effectiveness of community programs in a systematic manner.

Targets

Community complaints responded to, resolved, and resulted in measures to prevent reoccurrence

2022 Target
100%

2030 Long-term Target
100%

SROI results in strategic CSR projects

2022 Target
2:1* Ratio

2030 Long-term Target
2:1* Ratio

Community engagement score

2022 Target
More than or equal to **85%**

2030 Long-term Target
90%

Management Approach

Thaioil Group has established a policy and strategy for corporate social responsibility. The performance results are reported to the Corporate Governance and Sustainability Committee on a biannual basis.



The details of Thaioil Group's Corporate Social Responsibility Policy and Strategy are disclosed on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=163&lang=en>

Community Needs Assessment and Engagement



Thaioil Group conducts community relations activities with the communities surrounding the refinery according to the "3-synchronization model" and the "5-Together" conceptual framework. This aims to encourage communities to participate in the development of their own communities, thereby becoming self-reliant and building strong communities while reducing impacts from Thaioil Group's operations. The Company allows the community to provide feedback for mutual problems resolution, in which stakeholders within the community have been identified based on risks and environmental impacts. In the meantime, the Company communicates and analyzes community needs through various communication channels, such as exclusive meetings, the collection of feedback from subgroups, on-site visits with the households surrounding the construction project, and a community engagement survey. The findings will then be analyzed to identify directions develop the community further.

Stakeholder	Engagement Approach
 Community Committee	<ol style="list-style-type: none"> 1. A monthly 3-synchronization model meeting. 2. A monthly meeting with community leaders. 3. Communication through various channels, such as an on-site visit of community relations officers, a group chat via LINE application, phone calls, official letters, and e-card 4. Open house activities.
 Village Health Volunteer Group	<ol style="list-style-type: none"> 1. A bimonthly meeting with Village Health Volunteer Network. 2. Engagement activities with Village Health Volunteer Network. 3. Communication through various channels, such as an on-site visit of community relations officers, a group chat via LINE application, phone calls, official letters, and e-card.
 Local Government Agency	<ol style="list-style-type: none"> 1. A monthly 3-synchronization model meeting. 2. Coordination with local government agencies to provide on-site activities in case that communities have concerns towards Thaioil Group's operations.
 Elderly Group	<ol style="list-style-type: none"> 1. Health promoting activities for the elderly. 2. On-site activities with the Village Health Volunteer Network to gather feedback.
 Fishery Group	<ol style="list-style-type: none"> 1. Community relations and engagement activities with the fishery group. 2. Communication through local fishery group leaders to inform on operations and to gather feedbacks. 3. Communication through community leaders.
 NGOs / Environmental Impact Assessment Committee	<ol style="list-style-type: none"> 1. A committee meeting to align understanding. 2. An Environmental Impact Monitoring Committee meeting in accordance with EIA regulations.



Stakeholder	Engagement Approach
 Ship Operator Group	<ol style="list-style-type: none"> 1. An ad hoc meeting in case that any event occurs. 2. Communication through community leaders.
 Youth Volunteer Network and Committee	<ol style="list-style-type: none"> 1. A monthly youth volunteer network meeting. 2. Engagement activities with youth volunteer network. 3. Communication through various channels, such as a group chat via LINE application, Facebook, or phone calls.
 People living close to the refinery	<ol style="list-style-type: none"> 1. Community forum activity to communicate on Thaioil Group's ongoing projects and collect feedbacks. 2. On-site visits to communicate and align understanding on the construction projects as well as involve community members in problem solving.
 General Public	<ol style="list-style-type: none"> 1. Community relations activities and projects. 2. Communication and feedback collection through community committee.

Thaioil Group has carefully implemented prevention and problem-solving measures for communities in case of any impact occurrence. The Company has a central office that allows communities to report incidents or grievances. According to the operational procedures, the central office will coordinate and collaborate with the internal functions in case of any complaints about occupational health, safety, and the environment. Meanwhile, the Company encourages community participation to enhance quality of life and community development through community relations activities and projects in four areas, namely: society, religion, tradition, and culture; health; education; and environment. This allows the Company to systematically respond and manage the expectations of the community .

2022 Performances

Social Investment by Types and Proportion (% of cost incurred)

Total **296.4** million THB of social investment

Types of charitable contribution (cost incurred)

- Cash Contributions
- In-kind Contributions

Community Investment (% of cost incurred)

- Promotion of Education
- Energy & Natural Resource Development
- Environmental Conservation
- Community Well-being



Input

Management Overheads costs at approximately

36.10 million THB per year

Employee volunteering time valued at approximately

4.61 million THB

1,179
employee volunteers,
equal to a total of
6,450
volunteer hours



Output

79 projects/activities of CSR activities

32,114 visits
at The Community Health and Education Center in 2022

95
beneficiary organizations, or
49,255
individual beneficiaries



Outcome

The community engagement survey completed by the third-party agency found that community engagement was **95.85%**, which exceeded the set target of 85% of community engagement or above

The Company achieved overall SROI target of 2:1. The result came from the calculation of the Sustainable Energy for Health Care Project that installed a 80-kW solar rooftop power system for Laem Chabang Hospital in Si Racha District, Chonburi Province. **The SROI of this project, calculated for 25 years, is 5.2:1.**

Creating Social Value Through Community and Social Development Projects

Priority	Education (SDG target 4.3) 	Environment (SDG target 13.1) (SDG target 13.3) (SDG target 15.2)  	Energy (SDG target 7.2) 	Quality of Life (SDG target 3.8) (SDG target 8.3)  
Approach	Support education development initiatives in collaboration with academic institutions and award scholarships.	Manage forest conservation and rehabilitation and develop greenhouse gas reduction initiatives.	Develop alternative energy and promote efficient energy consumption.	Develop local communities to provide employment opportunities and promote public health.
Target	By 2023 <ul style="list-style-type: none"> Support skill development for more than 5,000 teachers and students in general education, English, science, sports, arts, and other areas. 	Support the Net Zero GHG Emissions target by 2060 <ul style="list-style-type: none"> Support the transition to a low-carbon society through forest conservation, rehabilitation, and reforestation, while creating biodiversity to balance local ecosystems. 	By 2023 <ul style="list-style-type: none"> Install solar power systems in four hospitals, medical centers, and schools. 	By 2023 <ul style="list-style-type: none"> Organize more than 12 job training programs. Over 300 beneficiaries participated in job training programs. Organize more than 10 activities to promote health. More than 500 community members participated in health promotion activities.
Social Value Created in 2022	Restart Thailand Project <ul style="list-style-type: none"> Employed 56 teaching assistants for 14 schools participating in the Restart Thailand Project. Teach for Thailand Project <ul style="list-style-type: none"> Developed two changemaker teachers in Science and English for schools around the refinery. 	Project to Plant Mangrove Forest for Carbon Credit Benefits in Collaboration with Department of Marine and Coastal Resources <ul style="list-style-type: none"> Planted mangrove forest across 56.22 rai in Chonburi Province. The forest can absorb approximately 1,520 tons of carbon dioxide equivalent throughout the project life of 10 years. 	Sustainable for Health Care Project <ul style="list-style-type: none"> Installed rooftop solar power system, with capacity of 80.24 kilowatts, at Laem Chabang Hospital in Si Racha District, Chonburi Province, which reduced electricity costs by approximately 400,000 THB per year. 	Health Promoting Activities <ul style="list-style-type: none"> Organized 31 yoga sessions with 40 participants per session. Organized 15 sessions of the 5-month Commitment 100,000 km. Walk and Run activities with 150 participants in each session. Organized 1 Relationship-building sport activity with 250 participants. Job Training Activity <ul style="list-style-type: none"> Organized a Laem Chabang Community Product course for communities with 7 participants. Community Health Survey Project <ul style="list-style-type: none"> 192 households visited for preliminary health check-up. 267 community members screened for non-communicable diseases, such as diabetes and high blood pressure, and participated in health promotion projects
Business Value Created in 2022	<ul style="list-style-type: none"> 65.95 million THB corporate reputation (PR value) generated by social development projects. The corporate volunteering culture included 1,179 volunteers who took part in 78 CSR activities for a total of 6,450 volunteered hours. 			

Highlighted CSR Projects in 2022, Categorized by CSR Framework Priority Area



Community Management



Objectives:

1. To enhance local economy and provide support for community to generate main and additional income.
2. To add value to community products and expand commercial channels for communities.

Priority Area: Quality of Life



Community Products Project for Communities Surrounding Thaioil Group

Background:

Thaioil Group has implemented the 'Additional Jobs for Increased Income' Project since 2019 to build knowledge and create additional jobs for community members providing additional way to earn household incomes. To support tangible and long-term benefits from job creation, the Company has planned and operated the project in collaboration with the communities, resulting in the Community Products Project for Communities Surrounding Thaioil Group.

Approach:

1. Gather community members who are interested in additional jobs, conduct a meeting to identify needs and interests of the community, and consider community strengths.
2. Organize training sessions on product development, packaging design, and marketing plans with experts.
3. Study and exchange knowledge with community enterprises or other agencies.
4. Plan and work with the community to register community product into community enterprise and OTOP (One Village, One Product), as well as collaborate with the universities to further develop products and create marketing plans.

2022 Performance:

1. Created a community product group under the LOMA Brand with 7 members from communities surrounding Thaioil Group. The brand produces healthy products, such as cold process soap, butterfly pea shampoo, lip balm, and also a gift set service. This project helps generate income for the group.
2. The group members studied and developed a fish sausage recipe that is made of local ingredients.
3. Provided knowledge on product development, packaging design, and product commercialization.
4. The group generated 41,660 THB of income from selling products.



CSR Networking & Branding



Objectives:

To help and support the victims of natural disasters in collaboration with the PTT Group.

Priority Area: Quality of Life



Project to Support Victims of Natural Disasters

Background:

To alleviate the suffering of people affected by the natural disasters, Thaioil Group has collaborated with the PTT Group to proactively prepare for disasters and provide assistances and supports.

Approach:

1. Monitor natural disaster situations in the country.
2. Provide assistance within the Company's operational areas.
3. Coordinate with the PTT Group to provide assistance for areas outside of the Company's operational areas.

2022 Performance:

Thaioil Group, in collaboration with PTT Public Company Limited, assisted people affected by flooding in Thailand. The Company donated survival bags for people in Ubon Ratchathani, Lopburi, Sing Buri, and Ayutthaya, which were delivered by the Company representatives. This helped around 2,000 people with a value of approximately 780,000 THB.



CSR Management



Objectives:

To raise awareness on the importance of the Circular Economy (CE) and knowledge relevant to communities and society

Priority Area: Environment



Thaioil CE School Model

Background:

Thaioil CE School Model is a project under the CE concept in the society by utilizing knowledge to develop a sustainable waste management model. The project has been expanded to cover schools surrounding the refinery and has allowed employees to be involved in the development of the project.

Approach:

1. Establish the volunteering working team to implement the project.
2. Organize activities to provide knowledge on waste management for students to raise awareness in upstream waste separation and income creation.
3. Schools to apply waste management knowledge.
4. Monitor and evaluate project results at the schools.

2022 Performance:

The Company has provided knowledge on waste management, both upstream and downstream, and systematically implemented waste management activities in the schools. The project had been monitored throughout the project, and the results were then used for further development. The participating schools were Wat Ban Na School and Wat Chak Yai Chin School in Si Racha District, Chonburi Province. This project resulted in 5,256 kilograms of recycled waste, or 20% of total waste before the project was executed. Moreover, the Company organized a knowledge sharing activity on waste management and circular economy for elementary students from Wat Mai Nern Payom in Si Racha District, Chonburi Province, to embed awareness on resource consumption efficiency.



Employee Voluntary Culture



Objectives:

To inspire volunteerism in employees and encourage them to contribute back to society, build the reputation of Thaioil Group as an organization that helps society.

Priority Area: Quality of Life



The “You Initiate... We Fulfil” Project: Year 2

Background:

Employees are the pivot of the organization which not only hold the expertise and accumulated experience necessary to drive operations but also embrace our value into practice. “Volunteerism” is a key value for Thaioil Group. The 60-Year Thaioil Volunteer Project, called “You Initiate... We Fulfil”, was first initiated in November 2020 to mark the Company’s 60th anniversary. In 2022, the “You Initiate... We fulfil” Project Year 2 was organized to prolong Thaioil Group’s volunteerism.

Approach:

1. Employees are encouraged to initiate their own volunteering activities between September 2022 – March 2023.
2. Employees are encouraged to record their activities on the Company’s internal application.
3. The Company will then turn these activities into financial donations and distribute to charitable organizations.

2022 Performance:

From the success of the first year of the project, the Company has continued the “You Initiate... We Fulfil” Project for the second year between September 2022 – March 2023 to continuously promote volunteerism for employees. The project aims to gain participation from employees with a record of activities in the internal application that can be turned into charitable donation of 300,000 THB to the following charitable organizations as follows:

- Sinapis Center Lorenzo Home, Chonburi.
- Foundation for Slum Child Care, Bangkok.





CSR Projects in 2022, categorized by CSR Framework



Dental Health Promotion Project for Schools Around Thaioil Group

Priority Area:
Quality of Life



To promote oral health for students.



Laem Chabang Youth Training for Jump Rope Championship Project

Priority Area:
Quality of Life



To encourage youths to exercise for their physical health, increasing their bone mass and muscle strength as well as reducing risks of heart disease.



5-Month Commitment – 100,000 km. Walk and Run Project

Priority Area:
Quality of Life



To encourage communities to exercise by walking and running to enhance their physical health. The Company also shared healthcare knowledge for participants to apply to themselves as well as their families.



Community Economic Support Project

Priority Area:
Quality of Life



To enhance community capability through job creation projects at the Si Racha District Community Health and Education Center.



Green Space Development Project on the Occasion of His Majesty the King's 70th Birthday Anniversary

Priority Area:
Environment



To increase green spaces as a permanent forest area and expand collaboration between various functions and agencies to develop on-land and marine environmental projects.



The Thaioil 60-Year Park Project in Laem Chabang City

Priority Area:
Environment and Quality of Life



To increase green spaces and recreational areas for communities in Laem Chabang City Municipality.



Thaioil CE WE GO Project: Promoting Circular Economy Values

Priority Area:
Environmental and Resource Efficiency



To raise awareness in energy and environmental conservation for employees and build good co-existing behaviour within the organization.



Sustainable Energy for Health Care Project

To build energy stability for the hospital and enhance the effectiveness of services provided for people, as well as support greenhouse gas reduction.

Priority Area:
Environment, Energy, and Quality of Life



Nature-based Solutions Project

To solve climate-related problems through rehabilitating degraded forests and expanding mangrove forest areas to be a carbon sink to support the absorption of carbon from the atmosphere.

Priority Area:
Environment and Quality of Life



Smart Farming Project

To develop pilot projects to design “new normal” processes to produce farming products, increase incomes, and help farmers and community enterprises achieve stable yields and reliable distributing channels, thus contributing to sustainably solving communities’ economic challenges.

Priority Area:
Quality of Life



PTT Group Model School Project and CONNEXT ED Project

To support basic education and develop leaders in schools and educational sectors, as well as become a significant part that drives education through knowledge exchange, learning, and developing schools with the school executives.

Priority Area:
Education



Teach for Thailand Project

To develop potential changemaker teachers to be teaching assistants for middle school students.

Priority Area:
Education



Thaioil Group Supports Youth Dreams in Becoming Sport Professional Project

To improve quality of life for youths living in communities surrounding Thaioil Group, as well as the offspring of employees by providing assistance with sports training and practices.

Priority Area:
Quality of Life



The details of Thaioil Group Corporate Social Responsibility Activities are disclosed on the Company's website:
<https://www.thaioilgroup.com/home/content.aspx?id=163&lang=en>





Governance and Economic Dimension

Ensuring robustness and maintaining trustworthiness in a good corporate governance system as a strong foundation towards sustainable business growth

Thaioil Group is committed to build an effective corporate governance system with the tone from the top in the transparent, fair, and accountable manner in accordance with the principle of corporate governance throughout the supply chain. To enhance growth and strengthen the business, Thaioil Group incorporates digital technologies in work processes to boost capability of suppliers and customers, in parallel with the development of innovation coupled with research and development to achieve high-value products while focusing on business excellence for sustainable development.



Innovation & Customer Stewardship



Developing innovation, energy, and engineering knowledge to create revenue and reduce production costs.

7

new high-value products

Thaioil Group's
Innovation maturity level

Level 3

out of 5 levels



Maintaining trust with customers for long-term business relationship

95%

customer engagement towards Thaioil Group



Digital Transformation



Building the knowledge management network and utilizing digital technology in the Organization to generate revenue and reduce production costs.

ZERO

case of cyberattack that disrupt business operations



Sustainable Supply Chain Management



Enhancing quality in the supply chain to improve operational processes in the energy industry.

100%

of critical suppliers received preliminary ESG risk assessment, covering all lines of products and services

80 million THB

of cost saving from the cooperation with other refineries and suppliers in crude oil tankers and distribution through Thaioil Group's loading buoy



INNOVATION & CUSTOMER STEWARDSHIP



Challenges, Risks, and Impacts

Although the 2022 was the year that the impacts of COVID-19 pandemic are in the process of recovery and normalization, it remained as a challenging year. In particular, the economic and oil price fluctuations have placed global impacts. Hence, to reinforce Thaioil Group's businesses amidst the fluctuating and unpredictable situations in the future, the "innovation" has become a highly significant matter as an essential part of the future sustainable and stable business growth.

The creation of new products to meet the needs of both existing and future customers has always been a challenge. To enhance the operational efficiency and synergies, Thaioil Group has established the High Value Product Development function by collaborating with various functions, including researchers, product engineers, product quality analysts, sales officers, to work towards the same goals and constantly follow up on work progress.

Targets



Short-term targets in the next 1-3 years

Emphasizing on employee's awareness raising on the importance of innovations to fortify sustainable business robustness, and continuously promote the employees' creativity to develop new innovations for the organization.

In 2023 - 2025, the Company will organize the activities for the employees in all functions to invent new ideas that can create organizational benefits and roll such ideas into practices. This is expected to significantly generate new innovations for Thaioil Group.

Commitments and Targets

2022 was the year that Thaioil Group has elevated the importance of "innovation". The Company has submitted the strategic plans for the innovation development, from the present to the year of 2030 for approval by the Board of Directors. Moreover, 2022 was the first year that Thaioil Group has conducted the assessment of the innovation level by an expert and credible consulting company. This allows the Company to improve and elevate innovation levels in the future.

In addition, the corporate value "POSITIVE" has been rectified, the definition of "I" was changed from "Initiative" to "Innovation" emphasizing the significance of innovation. This will help Thaioil Group become the future sustainable leader. The Company has also demonstrated the commitment towards innovation development with the aim of becoming the outstanding innovative company by 2030.



Medium-term targets in the next 3-5 years

Emphasizing on employee's awareness raising on organizational innovation development. This aims to reinforce business robustness and encourage the employees as the essential part to continuously create innovations through their potential. Meanwhile, the corrective actions for innovation development have also been implemented as needed. The improvement of the work processes to support innovation creation becomes another important part to develop the Company towards the innovative organization in the future.

Furthermore, Thaioil Group has prioritized customer satisfaction in products and services, starting with order receipt all the way through the management process to ensure that the customers have received the products and services completely, accurately, and timely. Also, the complaint process and responses will be closely monitored and resolved. Thaioil Group cooperates with the customers to develop products that fulfill their needs, which allows the Company to properly adjust marketing plans and to build our strong strategic partnership.

2022 Target



Maintain customer engagement rate with Thaioil Group

92%

Management Approach

In 2022, the Board of Directors has endorsed the Company's strategic plan for innovation development, consisting of internal and external innovative culture building strategy and innovative product and process strategy through R&D. This can be divided into 6 essential pillars as follows:

- 1st Pillar** Crude Excellence Center
- 2nd Pillar** Catalyst & Adsorbent Excellence Center
- 3rd Pillar** AI/Robotics Solution Provider
- 4th Pillar** High-Value Product (HVP) & High-Value Business (HVB)
- 5th Pillar** Polymer & Olefin Derivatives
- 6th Pillar** Sustainability & New Business

The researchers have coordinated with the relevant functions, such as Production, Sales, and Business Development, responding to the specific customer needs through the customer-centric product development approach. Furthermore, the Research and Development function has also conducted a study and became a part of working team on carbon capture, storage, and utilization to support Thaioil Group's 2060 Net Zero GHG Emissions pathway, as well as the low-carbon businesses development, such as hydrogen and bio business.

Innovation Management

1. Innovative Culture

Thaioil Group has always supported the employees in the innovation's invention. The Innovation Contest and knowledge sharing activities have been continuously organized. In 2022, the Company shared the knowledge on innovation and has inspired the employees to create innovations through weekly articles which was emailed to the employees. This aims to emphasize the importance of innovations that will lead to sustainable business in the future.

Approach to build internal corporate innovative culture

Activities to build employees' awareness on innovations

These activities aimed to enrich employees' innovative ideas to become the great-quality innovators through building awareness, knowledge, and inspiration of innovations through the following activities:



TOP Innovation Newsletter: A weekly communication email with thought-provoking contents that promote creativity, out-of-the-box thinking, and mindset growth. This aims to cultivate innovator qualifications, awareness of innovation, and to provide information of advanced technologies. This activity has created a driving force and received very good feedback. The 44 newsletters were disseminated with over 4,687 reads, which was increased by 11% compared to the previous year, and the satisfaction score was at very good level (4.75/5.00).





TOP BCG Updates: A monthly communication email to provide knowledge on BCG, a new economic model of Thai government focusing on the three economic systems – Bio Economy, Circular Economy, and Green Economy. The contents, that employees were highly interested in, such as electric vehicles, hydrogen energy, and other innovation for reducing global temperature, were shared. This activity received a satisfaction score of 4.78/5.00 and received higher engagement than TOP Innovation Newsletter by 66%.



Innovation Talk: Thaioil Group invited the guest speakers who are specialized in innovations to share knowledge for the employees. In 2022, four sessions were conducted on the online platform. As a result, this activity gained higher engagement than 2019. The viewers have soared up by 44% while the satisfaction score has increased from 4.16/5.00 to 4.56/5.00.

2022 Thaioil Wisdom and Innovation Awards

Thaioil Group compiled initiatives and innovations in the 2022 Thaioil Wisdom and Innovation Awards, which are the platforms for employee to present their ideas for innovation, prototypes, and innovations. The initiatives and innovations would then be awarded to encourage innovators to continuously invent, develop, and create innovations. The number of initiatives and innovations in this project were increased by 231% compared to the previous event, aligned with the increased interests in innovation of Thaioil Group.

Approach to build external corporate innovative culture

The collaboration with external entities is one of the essential Research and Development Department's strategies allowing access to the new technologies and its further development towards commercialization. Beside the collaboration with the educational and public sectors, Thaioil Group has cooperated with the private research and development organization, Kao Industrial (Thailand) Co., Ltd, in 2022 to co-develop new products, such as emulsified asphalts (EA). This product combines strengths of Kao Industrial (Thailand) Co., Ltd as the one of the biggest emulsifier producers in Thailand and Thaioil Group as the one of the biggest asphalts producers in Thailand. The jointly developed product's chemical and mechanical qualification have been certified by the Department of Highways that it has completed the specifications and high quality.

Furthermore, another significant collaboration project with the industrial sector was the collaborative research and development with the PTT Exploration and Production Public Company Limited (PTTEP). This project aims to co-develop the carbon-based material from CO₂ by using the prototype technology of PTTEP and raw materials of Thaioil Group. Also, there was a collaborative development of technologies to utilize the appropriate raw material and to consider future opportunities in business partnership.

Thaioil Group has also continuously collaborated with educational and governmental departments, including the Petroleum and Petrochemical College, Chulalongkorn University. In 2022, the scope of study was extended to cover olefins products. Also, there was the collaboration with Vidyasirimedhi Institute of Science and Technology (VISTEC) in the research and development of catalysts and processes in electrolyte production in battery industry.

The significant 2022 research and development achievements involved with the high emissivity ceramic coating to increase the heat tolerance efficiency and preventing erosion at high temperature, the A.I.-controlled robots for cleaning compabloc plate heat exchanger in the manufacturing processes, and the emulsified asphalts in collaboration with Kao Industrial (Thailand) Co., Ltd.

Thaioil Group's innovation maturity assessment

In 2022, the executives of Thaioil Group have recognized the importance of innovation maturity assessment. Hence, RISE Accel Co., Ltd, was approved to conduct the innovation maturity assessment of Thaioil Group and to benchmark with the other leading companies. The Corporate Innovation Maturity Assessment, developed by RISE Accel Co., Ltd in collaboration with Sasin School of Management, Chulalongkorn University, was used as a tool in the maturity assessment.

The assessment results from interviewing 13 executives – including the CEO and President, Executive Vice Presidents, and Vice Presidents together with the survey from 324 employees of all levels. The innovation maturity assessment considered various factors, which can be classified into 4 areas, namely personnel, business, technology, and business ecosystem.

The results showed that Thaioil Group's corporate innovation maturity were in the level 3 (Challenger) from a total of 5 levels, implying the medium capability in creating innovations. Thaioil

Group has committed to improve the innovation maturity to achieve level 5 that reflects the high capability to continuously create advanced innovations and utilize innovations to gain business advantage and create sustainable benefits for the organization.

2. Product Innovation

The Research and Development Department has refocused the working processes from solving problems in production processes to developing high value products with the subsidiaries of Thaioil Group to meet the customer needs. The Company also seeks opportunities in high value products development in collaboration with the internal and external partners. For instance, the brainstorming with the product sales team to create new products, the collaboration with educational institutions to explore the technology and business trends for new product development. At the present, there are several projects undergoing the feasibility and cost-effectiveness study for the future product development. In 2022, the outstanding high-value products (HVPs) projects consist of:

Emulsified Asphalt (EA)



Emulsified asphalts are produced by mixing asphalt cement as the main raw material with the emulsifier, additives, and water. Emulsified asphalt can be used in low temperature (20-70°C), which is suitable for the pavement preparation and maintenance. It acts as a water-resistant glue holding and preventing each pavement layers from damage. Upon pavement completion, the water will evaporate, leaving only asphalt films that coats the road, which allows the road to quickly resume its service. In addition, the emulsified asphalts are also suitable to maintain the road with small damages.

This product was a result of the co-development project between Thaioil Group and the Research and Development Department of Kao Industrial (Thailand) Co., Ltd. The product received certifications on chemical and mechanical specifications from the Department of Highways based on the Thai Industrial Standards (TIS). Owing to its outstanding specification in the water-resistance of prime coat and the erosion-tolerant slurry seal, the lifecycle of road has been expanded. This co-developed project was completed in 2022 and currently used to improve roads and parking lots at Laem Chabang Hospital, Chonburi.

Light Residual Aromatic Extract (LRAE)



LRAE is a crucial part of tire manufacturing, categorized in the aromatic types of rubber processing oil. It helps mixing the tire components and creating good dispersion which resulting in desirable tire's specification development.

LRAE was developed from the rubber processing oil demands of the customers. The key specification contains the Polycyclic Aromatic Hydrocarbons (PAHs) with the lower than 7 ppm as required by the European Standard EN 16143 for pollutants control and environmental friendliness. With the cooperation between Process, Commercial, Lab, and R&D functions, the production process has been adjusted and factor-product relationship were identified in order to develop the products with PAHs value lower than 4 ppm as customer's needs. This is expected to be produced and commercialized in 2023.



Paraffinic Oil; TOPSol P200



TOPSol P200 is an essential component of sealing material production, categorized in the paraffinic or softener type of rubber processing oil product. It acts as a mixer of rubbers and other components creating good dispersion. This results in the material with desirable mechanical specifications that tolerate the changing work environments. The sealing material is a type of the EPDM foam used in automotive parts sealing any gaps of plastic parts, reducing grinding sound, preventing outside vehicle noise, and maintaining the temperature in the vehicle.

The unique property of TOPSol P200 is that it helps reducing the dependency of importing costly Gr II lubricant, by replacing with the comparable quality of the product. The TOPSol P200 has been tested and produced in the customer lab scale, and it is currently taking the test in the production scale.

Ceramic Coating



Ceramic coating is used for coating pipes of process furnaces, boilers, or heat exchangers to increase its efficiency by 3-5% of heat exchanging. Additionally, ceramic coating has a specification to prevent the high-temperature erosion.

Another specification of ceramic coating is that it can be used to coat refractory cement to prevent erosion and heat loss at the equipment wall and to increase heat exchanging efficiency with the re-emission ability. In 2022, Thaioil Group used the ceramic coating to coat the pipelines of the high-pressure boilers in the refinery area to prevent erosion in the high acidic environment.

3. Process Innovation

Thaioil Group encourages all functions to invent manufacturing process innovation by applying innovations and technologies that increase the manufacturing processes capacity in accordance with the principle of resource optimization. Furthermore, this allows the Company to increase efficiency and minimize production costs. The Company consulted with the subsidiaries in the PTT Group to conduct the study on decarbonization technology to develop appropriate technologies that reduce greenhouse gas emissions. The Company has also adopted the innovations to increase production efficiency with the outstanding projects as follows:

Crude Compatibility Prediction Model

This project aimed to develop the testing process of sedimentation in different crude recipes. The probability of sedimentation from the crude oil mixing can be predicted with an accuracy of approximately 90%. This prediction allows the Company to select appropriate crude oil as an input for the refinery and to reduce the chance of crude oils sedimentation at the heat exchanger in refining process. This model will not only reduce energy consumption, but also bring opportunities in using various types of crude oil. The Company can also lessen the dependence of technical guidance from external parties. In 2022, the benefits from this project were around 10 million THB. In 2023, the project will be further developed with the other types of crude oil.

RHCU Pilot Plant (Residue Hydrocracking)

RHCU Pilot Plant is a manufacturing simulation model of the refining unit in the Clean Fuel Project (CFP). The manufacturing process was designed by Thaioil Group's Research and Development function with the purpose of crude oil recipes selection that are suitable for refining processes considering different variants. The RHCU Pilot Plant was designed to have the processes corresponding to the actual refining process in order to get the accurate test results. This helps in production planning and crude recipes determination.

The RHCU Pilot Plant has been operated in a similar manner to the actual refining process. It requires 24-hour operation with a team of researchers to test and control the refining results to ensure its accuracy. This project provides several benefits, such as reducing production costs from selecting appropriate and cheaper crude oil recipes or more efficient catalysts. This can save around 440 million THB per year. Moreover, it can prevent sedimentation risk of the product deviated from the production unit, which can cost approximately 1,700 - 3,400 million THB per incident.



Customer Engagement and Product Quality Management

Thaioil Group places great importance in customer service under the concept of "We care, We give, We leave no one behind (Sai Jai Prom Hai Mai Ting Kun)". The Company emphasizes every aspect of customer care services such as product receiving, services, and project implementations to grow together. The Company also maintains product quality and safety as well as the services based on the rules, regulations, and international standards to protect customers and the society from negative impacts. This aligns with the corporate sustainable development that focuses on 3 aspects – Environmental, Social, and Governance (ESG). Furthermore, the Company has recognized customers' voices and taken prompt and effective actions to meet customer needs.

In 2022, Thaioil Group implemented the Partner for Life project to support customer service in 3 aspects as follows:

01 Partner for Growth: Aims to solve customer pain point and meet customer expectations through the Voice of Customer (VOC) system. The Company has also developed the new products and services to serve the expansion of manufacturing capacity in the Clean Fuel Project in the future.

02 Partner for Knowledge: Emphasizes on knowledge sharing for the customers to increase understanding on the production processes, product receiving, and E-Product catalogue through various channels to allow accessibility of the customers to Thaioil Group's products.



03 Partner for Service: Prioritizes the delivery of product and service to the customers. In 2022, Thaioil Group consistently delivered the products and services based on the standards of the Service Level Agreement (SLA), which is the development of ordering and product receiving system to be fast and convenient for customers. The Company has maintained product quality and safety in compliance with the laws, regulations, and international standards. Also, the Company has closely monitored and responded to the complaints.

Beside the 3 Partner of Life projects, Thaioil Group has implemented the “We care, We give, We leave no one behind (Sai Jai Prom Hai Mai Ting Kun)” Project to maintain good relationship with the customers such as organizing activities to promote good health, raising safety awareness in product receiving, and organizing activities with customers to promote art and culture.

2022 Performances



Social and Relationship Capital

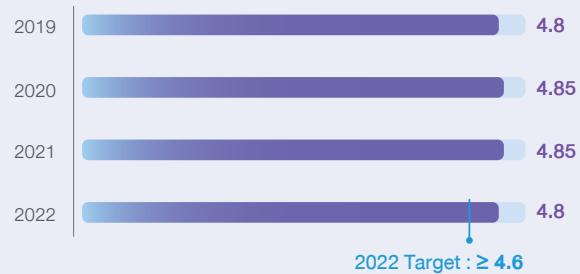
Customer Engagement - Thaioil Group*

Percent (out of 100%)



Customer Satisfaction - TOP Solvent Company Limited (TOPNEXT International Company Limited)

Score (out of 5.0)



Remark: *The customer engagement of Thaioil Group consists of Thai Oil Public Company Limited (TOP), Thai Lube Base Public Company Limited (TLB), and Thai Paraxylene Company Limited (TPX).





DIGITAL TRANSFORMATION



Challenges, Risks, and Impacts

In response to the Thailand 4.0 era, Thaioil Group recognizes the challenges of transformation to the digital era, such as shifting in the customer and consumer behavior, new ways of living and working, as well as increasing competitiveness through improved operational efficiency.

Thaioil Group adapts the potential of digital technology to enhance competitiveness in various activities throughout the supply chain. This includes purchasing crude oil, production process, product sales, customer interactions, human capital development, and data collection. By implementing a digital ecosystem, the Company has developed agile projects to create new user experiences and utilizing safe and appropriate technologies to increase flexibility and improve employee engagement.

Thaioil Group recognizes the value of data, which is prevalent in the industry. The Company manages and governs the use of internal information while developing a centralized platform to collect and analyse the data for operational enhancement. This creates the highest benefit for Thaioil Group's business both present and in the future. Furthermore, Thaioil Group places a great importance on cybersecurity and the cyber-attack risks that may arise on the digital platforms. This is to ensure that the information is secured and well-protected, not affecting the business operations in any way, as well as building confidence among all relevant stakeholders.

Commitments and Targets

Thaioil Group is committed to enhance competitiveness with digital operations and cybersecurity throughout the business activities in the supply chain. To achieve this commitment, the Company has established a comprehensive digital strategic framework that aligns with its business directions and strategies. This framework focuses on digital transformation, leveraging data-driven decision-making, implementing robust cybersecurity, fostering a modern working environment, and the provision of efficient IT services.

Target

Establish a digital foundation to enhance business competitiveness and empower employees with the necessary skills and abilities to effectively utilize technology (Digital Maturity Index: DMI).

2022 Target

Literate⁽¹⁾
(Level 2 from 4 levels)

2026 Long-term Targets

Leader⁽²⁾
(Level 4)

Cyber-attacks that affect business operations
(Zero Damage to Business).

2022 Target

Zero cases

Long-term Targets

Zero cases

Remarks :

(1) "Literate" refers to the company that has a well-defined digital plan and incorporates digital technology in its work processes.

(2) "Leader" refers to the company that fully integrates digital technology throughout the organization, including in innovation, and research and development.



Management Approach

To drive effective digital and cybersecurity development, the Company has established Thaioil Group Digital Steering Committee, which is responsible for setting policies and the overall direction of digital development and for driving the practices in the Digital Master Plan 2022–2030.

In 2022, Thaioil Group Digital Steering Committee reviewed The Digital Technology and Communication Policy and the Cyber Security Policy. Also, the Company has assigned an Information Security Executive to oversee the digital function, taking responsibility to supervise the overview and regularly report the results to the executives, the Risk Management Committee, and the Board of Directors.

In addition, the Company has appointed a Thaioil Group Cyber Emergency Response Team (CERT) to handle cyber incidents and assign responsible individuals from executive to operational levels.

The Company regularly monitors project performance and annually assesses its plan to ensure that the use of digital technology aligns with current business goals and responds to the rapidly changing circumstances and relevant factors.



The details of Thaioil Group Digital Management are disclosed on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=580&lang=en>



Highlighted Projects 2022

In 2022, 230 million THB was approved for investment to execute the comprehensive digital strategy. Key areas include:

01 Digital Transformation

Thaioil Group prioritizes the integration of digital technology to enhance business competitiveness. The Company has established a strategic plan and executed various projects related to digital technology. In 2022, the highlighted projects include:

Centralized Customer Platform Project

The Company has implemented Salesforce, a globally recognized platform, into its customer database management system. The platform helps collect and analyze 360-degree customer information, while enhancing the capabilities and services of commercial and sales teams to better understand each customer's patterns and needs. This also boosts sales prospects and provides significant data for future projects such as "Lead and Opportunity Management" project, which are the process of identifying potential customers or business opportunities.

Operation Handheld Project

The Company provided the operation handheld device for employees working in the operational sites. These devices have been installed for various applications for use in operational sites. The Permit on Mobile and e-Plot Plan program were also installed and developed. The Company also has a plan to constantly develop new applications. This project has revolutionized work processes by allowing employees to access tools and information anytime and communicate with the relevant parties in a real-time manner, leading to increased efficiency. Besides, this project received a gold award from the PTT Group Operational Excellence Contest Award.

02 Cybersecurity Management

Thaioil Group has adopted the National Institute of Standards and Technology (NIST) Cybersecurity Framework from the United States, and Zero Trust Architecture protection guidelines into its management approaches. The approaches include login examination and granting users the minimum necessary permissions to ensure that Thaioil Group has appropriate cyber risk controls for its size and diversity. Key activities include:

- Implementing Privilege Access Management (PAM) for server computer systems.
- Enforcing Multifactor Authentication (MFA) for VPN and email access.
- Installing Endpoint Detection and Response (EDR) anti-virus software on all devices.
- Establishing conditional access controls to verify system access and protect critical company information.
- Implementing the mobile device management for Bring Your Own Device (BYOD) in a secure manner.
- Conducting monthly employee phishing awareness tests to educate and modify behavior regarding cyber threats.
- Developing the Cyber Emergency Response Procedure in line with the Company's overall Emergency Response Plan. This plan is regularly rehearsed at least twice a year, covering digital technology, operational technology, business continuity plan, and communication protocols for internal and external stakeholders in the event of cyber emergency.

Cyber Emergency Response

The Company conducted a ransomware assessment and developed a response playbook to efficiently tackle cyber incidents. The training plan on cyber emergency responses was developed and implemented with consultants and executives in 2022. The Company regularly reports the results of operations to executives while presenting the outcomes of security and cyber security risk management to the Risk Management Committee.

In addition, Thaioil Group has engaged external consultants to assess cyber security gaps throughout the organization. Currently, the Company has completely resolved all identified issues. The Security Operations Center (SOC) is also established to continuously monitor and manage cyber risks for 24 hours a day.

 <p>Governance and Working Process Improvement</p>	<ul style="list-style-type: none"> • Revise digital policies, such as the use of digital technology and communications policy, the use of social media policy, and the personal data policy. • Prepare readiness for employees and test their knowledge and understanding of working processes. 	<ul style="list-style-type: none"> • Educate and raise awareness of personal information usage.
 <p>Personal Data Management System</p>	<ul style="list-style-type: none"> • Establish a personal database to identify personal data sources, develop notification systems, establish consent and revocation processes, and send other requests to the data owner. 	<ul style="list-style-type: none"> • Conduct risk assessments and develop improvement plans and risk mitigation measures.
 <p>Personal Data Leaking Prevention Systems</p>	<ul style="list-style-type: none"> • Develop data leaking prevention system in the user's program to allow only those who have rights and permissions to access. • Develop a system to secure data protection and encryption for portable storage devices. 	<ul style="list-style-type: none"> • Implement encryption for personal data and prevent personal data disclosure. • Run tests and scans to identify gaps in the program.
 <p>Data Use Inspection and Monitoring Systems</p>	<ul style="list-style-type: none"> • Record personal information access history. • Perform penetration testing on programs to handle personal data. 	<ul style="list-style-type: none"> • Implement advanced technology to enhance protection from external cyberattacks.



03 Improving customer service and user experience of the Company's digital system

Thaioil Group prioritizes a standardized digital service management to improve business operations. The Company adopts the recognized international standard ISO/IEC 20000-1:2018 for IT service management and the Information Technology Infrastructure Library (ITIL)

framework. This provides excellent work procedures to improve digital service standards within the organization, which the appropriate technologies and digital experience creating approach can be employed to enhance the efficiency of digital services.

2022 Performances



Financial Capital



Knowledge Capital

Cases of cyberattacks affecting the business operations:

Zero cases

All IT infrastructure with cyber threats obtained ISO 27001 certification, including:

1. The Data Center, SAP and LIMS systems, under the control and management of the Digital Function.
2. Advanced Process Control Network, under the control and management of the Technology Process Control Function, which supports service activities and work processes within the Thaioil Group.
3. Instrument Network, under the control and management of the Instrument Engineering Functions.
4. Telecommunication and ELICS systems, under the control and management of the Electrical Engineering functions.

Total
100% certified by ISO 27001



IT service management system obtained ISO/IEC 20000-1:2018 certification:

Certified in 2022



SUSTAINABLE SUPPLY CHAIN



Challenges, Risks, and Impacts

The procurement of Thaioil Group has prioritized on supply chain management involving a large number of suppliers. During COVID-19 pandemic, the Company has avoided any impact on Environmental (E), Social (S), and Governance (G), which are significant factors for key business operations. Moreover, the Company has enhanced stakeholders' quality of life, and has generated sustainable returns.



More details on the SCOC can be found on the Company's website: https://www.thaioilgroup.com/home/media_ebook.aspx?id=239&lang=en

Commitment and Target

Thaioil Group has committed to carry out sustainable procurement practices in line with Thaioil Group's Sustainability Management Framework. This considers sustainable business, including Economic, Environmental, Social, and Governance aspects, together with the procurement principles; namely, Clear, Fair, and Professional. Furthermore, the supplier development is governed by the Sustainable Code of Conduct for Suppliers of Thaioil and Subsidiaries (SCOC). Since 2015, every new supplier in the registration system has acknowledged the SCOC, which is being continuously implemented. This aims to integrate the procurement process as a part of the business strategies' achievement in alignment with international standard of ISO 20400: Sustainable Procurement. This will minimize the chance of business disruption and the delays caused by unforeseen events. At the same time, it will optimize the resource efficiency management to achieve competitive advantage, create long-term benefits for Thaioil Group and suppliers, and maintain trust for all stakeholders.

Targets

Critical suppliers



2022 Target:
SCOC
Acknowledgement

2026 Long-term Target
100%

Key suppliers



2026 Long-term Target
90%

New registered suppliers



2026 Long-term Target
100%





Management Approach

To achieve sustainable targets across the supply chain, Thaioil Group determined strategic plans 2022-2026 towards sustainable procurement excellence by setting ESG targets as one of the operational goals.



More details on the strategic plans can be found on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=235&lang=en>

Thaioil Group's Suppliers

Thaioil Group has selected the suppliers through Ariba System, which embeds the supplier selection criteria in a preliminary supplier assessment form. The criteria include the assessment of the quality of products and services, and supplier's financial status. In addition, 41% of the overall criteria focus on sustainable procurement through Environmental, Social, and Governance (ESG) aspects, including product delivery information, safety management, SCOC acknowledgement, third-party verification such as ISO9001, ISO14001, ISO/IEC17025, OHSAS18001, and ISO50001. In addition, there is a data verification process to examine policies and corruption prevention measures for the suppliers who potentially have corporate governance risks, such as the suppliers who are working with government agencies.

The post assessment of suppliers after delivering products and services is conducted through the systems in which the method will differ based on the priority of products and services. The sustainability topics are integrated in the assessment criteria, such as the Security, Safety, Health, and Environment (SSHE)

management, Environmental, Social, and Governance (ESG) management, as well as the compliance with laws and regulations on the transportation of product and services, and the delivery of hazardous goods.

Thaioil Group classifies Tier-1 suppliers into three groups as follows:

- 01 Strategic Supplier (Critical Supplier):** suppliers that are significant for Thaioil Group's businesses
- 02 Key Supplier:** key suppliers that mainly provide products and services for Thaioil Group's businesses
- 03 Managed Supplier:** general suppliers that provide products and services for Thaioil Group's businesses

Thaioil Group also classifies Critical Non-Tier 1 suppliers as the suppliers that provide products and services for our critical tier-1 suppliers, which the products and services are deemed to be a critical significance for our businesses.

In 2022, the supplier classification of Thaioil is listed as follows:



Total Tier-1 Suppliers	1,031
Critical Tier-1 Suppliers	42
Critical Non-Tier 1 Suppliers	15

Procurement Spending Ratio



Supply Chain Management

The process of Thaioil Group's supplier management includes supplier registration, supplier lifecycle and performance assessment, and supplier risk monitoring through external database to assess risks, such as regulatory & legal, financial, environmental & social, and operational.

For more details, the supply chain management is available on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=318&lang=en>

Effective Cost Management

Thaioil Group has set the target to reduce costs in the procurement processes. In 2022, Thaioil Group has successfully achieved the target. This enables the Company to have effective cost management and the competitive costs in the market. Henceforth, this has increase the efficiency of the procurement processes, while further reducing the environmental impacts. The key implementations are described as follows:

- The Framework Agreement: A long-term contract within 5-6 years for the supplier providing the essential products for Thaioil Group. This helps the Company secure standard prices and maintain long-term trading. In addition, the framework assists to build a good relationship between Thaioil Group and suppliers as mutual benefits. Consequently, Thaioil Group saved the average cost per task by 25%. The examples of the tasks are the procurement of spare parts and the distributed control system (DCS).
- Contract analysis: The analysis is conducted once the purchase/service requisition has been issued, to develop strategic sourcing plan which saved approximately 10% of the cost per task. For example, the procurement of spare parts in the equipment and machines, or contracting of technical services, such as electricians, mechanics, or engineers.

- Collaborative procurement with the PTT Group: Thaioil Group has signed the supplier contracts with the other companies in PTT group to collectively combine orders. This help create a bulk purchasing, strengthen the negotiating power of the companies in the PTT Group and build good relationships with both PTT Group and suppliers. Consequently, this saved approximately 14% of the cost per task, such as the procurement of chemical products, office supplies, spare parts of equipment and machines, and contracting of services, such as crane rentals or equipment and machine control systems.

- Budget analysis: Thaioil Group conducted a budget analysis of various projects to develop the procurement sourcing plan. This enables the Company to deliver the goods and services within the project timeline.
- E-auction: Thaioil Group applied the e-auction system for the goods having similar standards to increase efficiency in the procurement process, diversity of bidding suppliers, and competitiveness.
- “ONE” Project: Thaioil Group has collaborated with the PTT Group and its refineries to source crude oil under the “ONE” project. The project aims to optimize the opportunities in crude oil sourcing, maximize efficiency and variations, and timely respond to the fluctuating market.
- Domestic sourcing: Thaioil Group collaborated with the PTT Group to increase the sourcing capacity of domestic crude oil. This will help to reduce the impacts resulting from the fluctuating price of crude oil.
- The outbreak of COVID-19 pandemic and its viral mutation along with the economic and transactional boycott on Russia; one of the biggest oil producers in the world, had continuously caused the fluctuation in oil prices and petroleum product demands. Therefore, Thaioil Group has



adjusted crude oil sourcing to maximize its value-added and avoided crude oil sourcing from Russia due to the international boycott. Thaioil Group aligned the volumes and types of crude oil inventory in the refinery with the market conditions. Also, the Company has reoptimized the existing crude oil by selling and sourcing other types of crude oil with higher value.

- Crude oil cost reduction: Thaioil Group not only provided crude oil transfer service through the Company's buoys to other refineries in Thailand, but also collaborated with other refineries to hire crude oil tankers to reduce costs. In 2022, the Company has generated approximately 80 million THB from the crude oil transfer service through the buoys and reduce crude oil transportation costs.

2022 Performances



Financial Capital

25%

cost saving from the Framework Agreements with suppliers for the supplier providing the essential products for Thaioil Group.



Human Capital

122 hours

of training on the procurement employee development

- PTT Group KM Sharing
- International Professional Certificate in Supply Chain Management Sourcing
- Online Course via Thaioil Academy
 - GENERAL SPECIFICATION, STANDARDIZATION & REQUIREMENT
 - MESC CODING CONCEPTS & SAP MASTER DATA MAINTENACE
 - SAP INVENTORY CONTROL & PARAMETERS
- Ariba Contract System Training Session
- Competency Base Interview Technique (For New Interviewers)
- Cyber Security Awareness Training
- Information Security Requirement to ISO/ IEC 27001: 2013
- Integrated Management System & Internal Audit (ISO9001: 2015, ISO14001: 2015 & ISO45001: 2018)
- Developing Sustainable Procurement Practices in alignment with ISO20400

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

Thaioil Group has preliminary supply chain risk assessment process in line with ISO 20400 – Sustainable Procurement to identify suppliers with high ESG risks for all newly registered supplier, and all suppliers every 3 years.

In 2022, Thaioil Group assessed supplier risks relevant to the ESG issues listed in the Sustainable Code of Conduct for Suppliers of Thaioil and Subsidiaries (SCOC). As a result, 100% of newly registered suppliers and all suppliers rolling three-year period assessment have taken the assessment in 2022.

The assessment is conducted in the product and service level of each supplier, which includes 7 key topics in line with ISO 20400 Sustainable Procurement as listed below:

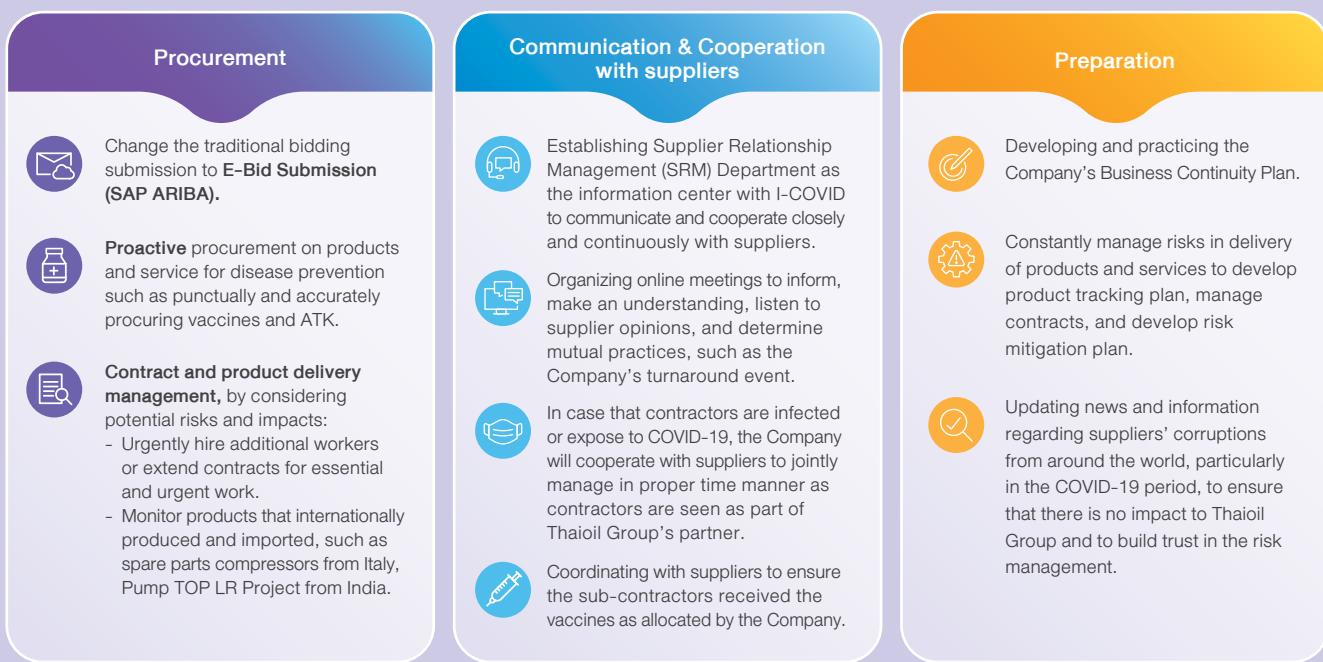
- Governance
- Human Rights
- Labour Practices
- Environment
- Fair Operating Practices
- Consumer Issues
- Community Involvement & Development

Despite the COVID-19 pandemic situation, Thaioil Group has conducted the supplier ESG risk assessment throughout the value chain. This includes the quality of work, occupational health and safety, and the timely of delivery of products and services. Moreover, Thaioil Group has communicated COVID-19 prevention measures to the suppliers, organized online meetings to inform and acknowledge suppliers' opinions to determine mutual practices. For the contractor, Thaioil Group has facilitated for the contractors to receive vaccines allocated by the Company while provided guidance for contractors regarding the Work From Home (WFH) Policy.

Regarding contract and delivery management, Thaioil Group assessed the impacts through risk assessment and monitoring the long lead items to source additional workers and extend the terms of contracts for urgent works.

During the supplier management in the period of maintenance turnaround, particularly, the Company prepared the Contingency Plan to tackle with the impacts of COVID-19 and the impacts to the maintenance plans. Consequently, the operations have been successfully completed as planned.

Furthermore, the Company developed and conducted the practices on the Company's Business Continuity Plan. Also, the risk management is regularly considered in the product and service delivery to develop the product tracking plans, manage the contracts, and develop the risk mitigation plan. In addition, the Company has updated the information on supplier corruption from around the world, particularly in the COVID-19 period, to ensure that there is no impact to Thaioil Group and to build the trust on risk management.



In 2022, Thaioil Group has conducted preliminary ESG risk assessments for tier-1 suppliers and critical non-tier 1 suppliers, accounting for 100% of all suppliers. The findings are as shown below:

- 14 Tier-1 suppliers that may expose to ESG risks, accounting for 1.36% of all Tier-1 suppliers
- No Critical Non-tier 1 suppliers that may expose to ESG risks.

Regarding the results of the preliminary risk assessment covering 7 main topics aligned with ISO 20400 – Sustainable Procurement, Thaioil Group selected 86.27% of Critical Tier-1 suppliers and Critical Non-tier 1 suppliers, and 85.71% of suppliers with high ESG risks, to participate in third party's comprehensive assessment. The third party considered supplier's audit reports such as ISO 14001, ISO 50001, ISO 45001, OHSAS 18001, ISO 9001, ISO/IEC 17025, ISO 27001, the Green Industry Award by Department of Industrial Works, the CAC project, the CSR-DIW project, safety audit results, and waste audit results.



Evaluating Risk Assessment Performance

Governance

Thaioil Group expects all suppliers to acknowledge our SCOC. To ensure the supplier's understanding on the SCOC, the Company has communicated through website and annual seminars with Thaioil Group suppliers.

Non-hydrocarbon suppliers

Unit	2019	2020	2021	2022
Year	2019	2020	2021	2022
Suppliers that acknowledged SCOC	1,116	1,178	1,377	1,581
Number of suppliers	28.74%	33.74%	41.73%	61.02%

Hydrocarbon suppliers

Year	2019	2020	2021	2022
Crude oil suppliers	100%	100%	100%	100%

2022 Target: 100%

100% Newly registered suppliers 2022 Target: 100%

100% Critical suppliers 2022 Target: 100%

85.25% Key suppliers 2022 Target: 80%

Environment

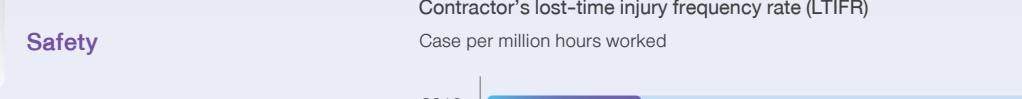
During marine transportation, Thailoil Group controls ocean loss index through establishing Energy Management & Loss Improvement Working Team & Internal Energy Audit Team to monitor and analyse the root cause of the ocean loss during marine transportation in every trip and continuously implement corrective actions to maintain the ocean loss index at the level that does not exceed the set targets.

Ocean loss index
Percent by volume

Year	Ocean loss index (Percent by volume)
2019	0.18
2020	0.16
2021	0.21
2022	0.33*

★ 2022 Target : Less than 0.25

*Due to the increased proportion of crude oil from the Middle East region from economic value in the production, the probability of % loading loss at the origin ports become higher than 2021.



The dashboard features a purple shield icon with a white cross and a blue heart on the left. The word 'Safety' is written in purple. Below the icon, a text box states: 'Thaioil Group closely monitors lost-time injury frequency rate (LTIFR) of contractors to ensure that all life and assets are safe and free of accidents.' To the right is a chart titled 'Contractor's lost-time injury frequency rate (LTIFR)' with a subtitle 'Case per million hours worked'. The chart shows data for 2019, 2020, 2021, and 2022. Each year has a dark blue bar representing the actual LTIFR and a light blue bar extending to the right representing the target. A vertical line with a star at the bottom indicates the 2022 target is zero.

Year	Actual LTIFR	Target LTIFR
2019	0.11	0.11
2020	0.06	0.06
2021	0.07	0.07
2022	0.16	0.00

★ 2022 Target : Zero

Supplier Capability Building

Besides close cooperation and direct recommendation to the suppliers with high risk levels and/or with non-compliance with SCOC, Thaioil Group also provides opportunities for all suppliers to participate in other activities to increase capability and capacity in ESG management. The activities include:



Thaioil Group communicated the visions and the current situation, including business directions, significance of 2023 procurement policies, and QSHE measures. The Company also propagated Thaioil Group's sustainability management; consisting of human rights, corporate governance, and net zero GHG emissions target through the annual supplier seminar under the theme of "TOP Up Partner Value" to achieve the vision towards "Partner for Life".



Thaioil Group constantly communicated COVID-19 prevention measures and encouraged the supplier to comply with the measure through emails and online meetings. Also, the Company closely managed the suppliers through various activities, such as organizing ATK test training for contractors.



Thaioil Group communicated and raised the QSHE topics in all dimensions through All SAFE White Green 2022 strategy to the suppliers in the refinery area.



Thaioil Group organized a meeting for contractors to announce the Contractor Management System (CMS) to make contractor cards and safety passports.



Thaioil Group conducted the safety introduction workshop for safety personnel and contractor supervisors to prepare for Thaioil Group's major turnaround.





Thaioil Group organized relationship building activities for the suppliers to ensure their awareness, understanding, and compliance with Thaioil Group's commitments on transparency in procurement processes, such as the No Gift Policy.



Thaioil Group organized the meetings between contractors and Thaioil Group management executives by emphasizing on safety operations and preparedness on the major turnaround to deliver the task as planned.



Thaioil Group invited 526 key suppliers to join the PTT Group CG Day event with the PTT Group via an online system.



Thaioil Group organized the Management Site Walk in the 2022 Thai Lube Base Public Company Limited Pack B major turnaround on 17th-21st and 24th October 2022 to build awareness on workplace safety in the TLB Pack B major turnaround. The contractor managements were invited to join the onsite walk inspection.



Thaioil Group organized the 2022 Contractor Award ceremony for contractors of Thai Oil Public Company Limited and Thai Lube Base Public Company Limited in the major turnaround to express gratitude and support for contractors that dedicated their efforts into the major turnarounds and successfully completed as planned. Particularly, the safety targets had been achieved amidst the outbreak of the COVID-19 pandemic.

Supplier Engagement and Satisfaction

In 2022, Thaioil Group has continuously been developing the E-Procurement system, such as Contractor Management System (CMS), to make the procurement processes “Clear”, “Fair”, and “Professional”. As getting higher participation, the suppliers gained more benefits, reduced the cost, and saved traveling time and consequently the supplier satisfaction has been increased.

Thaioil Group has driven the use of Online PO system for suppliers through the E-Procurement system to shorten work procedures, increase convenience for suppliers, and promote environmental support. At the present, approximately 756,000 pieces of papers were reduced through Online PO system. This leads to reduce resources and energy consumption.

In addition, Thaioil Group has conducted a survey for suppliers who have participated in online bid submissions through the E-Procurement system. The findings showed that most suppliers are highly satisfied with the system. This is because the system can help them reduce the cost. Compared to the traditional bid submissions, approximately 2,160 THB per submission and 5.39 hours of travel time were saved.

Thaioil Group has developed the Contractor Management System (CMS) to support the post-award processes for suppliers. Suppliers can submit a request to make a contractor card for entering Thaioil Group’s facilities through the CMS System anywhere and anytime. The system assists to record and verify contractor information as regards to the Personal Data Protection Act. Moreover, suppliers’ performance can be evaluated via the Contractor-Performance Management



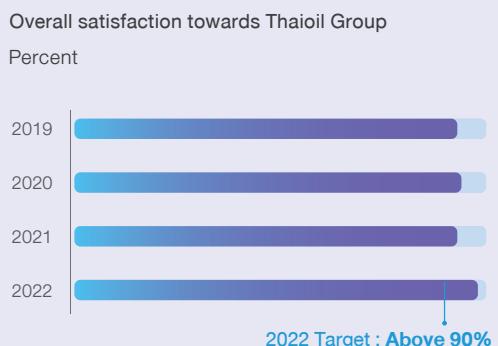
System (C-PMS). After completing tasks in the contracts, Thaioil Group will take the KPI of various aspects, such as ESG, SSHE, or quality of work as agreed with suppliers, to evaluate supplier performance and open a discussion floor for further development.

In order to, ensure that Thaioil Group has recognized the needs of suppliers, Thaioil Group has created engagements, communications, and discussions by surveying supplier perspectives towards Thaioil Group in terms of procurement management principles, services, transparency, and fairness. Thaioil Group will then bring all the opinions into the Company’s decisions and operations. In 2022, Thaioil Group has surveyed supplier perspectives and opinions through the external expert, the result of supplier survey to Thaioil Group are as follows:

2022 Performances



Social and Relationship Capital



Satisfaction towards Transparency and Fairness





PERFORMANCE SUMMARY

Economic Performance ⁽¹⁾		Unit	2019	2020	2021	2022
Economic Value Generated						
Sales Revenue	Million THB	361,768	242,840	335,827	505,703	
Economic Value Distributed						
Cost of Sales of Goods and Services ⁽²⁾	Million THB	355,756	255,300	319,555	481,137	
Economic Value Retained						
EBITDA	Million THB	14,149	(2,056)	28,142	37,187	
Net Profit/ [Loss]	Million THB	6,277	(3,301)	12,578	32,668	
Financial Position						
Total Assets	Million THB	283,445	306,188	362,144	444,581	
Total Liabilities	Million THB	159,521	186,069	239,050	285,924	
Equity	Million THB	123,924	120,118	123,094	158,657	
Financial Ratio						
Interest Coverage Ratio	Times	4.3	(0.5)	7.8	9.6	
Current Ratio	Times	3.5	4.0	2.6	1.5	
Net Debt to Equity Ratio	Times	0.3	0.7	1.4	1.0	
Return on Equity ⁽⁴⁾	Percent	5.2	(2.8)	10.6	23.5	
Return on Total Asset	Percent	2.4	(1.0)	3.9	8.2	
Stock Data						
Net Profit/ [Loss] per Share	THB/Share	3.08	(1.62)	6.17	15.63	
Annual Average of Daily Closing Stock Price ⁽³⁾	THB/Share	68.26	43.95	54.38	53.93	
Market Capitalization	Million THB	139,252	89,659	110,937	114,752	
Dividend Payment	THB/Share	1.50	0.70	2.60	3.70	
Dividend Yield ⁽³⁾	Percent	2.2	1.6	4.8	6.9	
Book Value	THB/Share	58.81	56.97	59.25	69.85	

Remarks:

- (1) Economic performance reporting scope is aligned with the Financial Statements 2022.
- (2) Expenses related to business operations.
- (3) Calculated by the annual average of daily closing stock price.
- (4) The method of calculation has been adjusted according to the rules of the Office of the Securities and Exchange Commission
- (5) The membership fee depended on total revenue from the financial statement in the past two years

Contributions to Organizations and External Associations ⁽¹⁾						
Type of Organization	Name of the Organization	Unit	2019	2020	2021	2022
Tax Exempt Group	Global Compact Network Thailand	THB	35,000	35,000	35,000	35,000
Trade Associations	Board of Trade of Thailand	THB	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	25,680
	Investor Club Association ⁽³⁾	THB	0	0	0	0
	Oil Industry Environmental Safety	THB	1,832,000	1,778,000	1,683,000	1,693,000
	Group Association (IESG)					

Type of Organization	Name of the Organization	Unit	2019	2020	2021	2022
Trade Associations	Oil Spill Response Limited (OSRL)	THB	1,779,211	1,736,839	1,740,193	2,012,460
	International Fund for Compensation for Oil Pollution Damage	THB	1,007,946	833,016	0 ⁽²⁾	6,691,436 ⁽⁴⁾
	Petroleum Institute of Thailand (PTIT)	THB	786,430	824,381	819,309	886,553
	The Association of Private Power Producers	THB	85,600	85,600	42,800	42,800
	Thailand Business Council for Sustainable Development (TBCSD)	THB	250,000	250,000	250,000	250,000
	Federation of Thai Industries ^{(5), (6)}	THB	76,000	194,000	177,000	186,000
	Thai National Shippers' Council (TNSC)	THB	25,000	25,000	25,000	25,000
	The Thai Chamber of Commerce	THB	23,000	23,000	23,000	23,000
	Water and Environment Institute for Sustainability	THB	53,000	0	0	0
	-	THB	0	0	0	0
Lobbying, interest representatives, or similar	-	THB	0	0	0	0
Local, regional, or national political campaigns/candidates	-	THB	0	0	0	0
Others (e.g., spending related to ballot measures or referendums)	-	THB	0	0	0	0
Total		THB	5,947,587	5,779,236	4,792,502	11,866,449

Remarks:

- (1) The contribution collected from subsidiaries in Thaioil Group, representing 0.003% of sale revenue.
 (2) Membership fee exemption.
 (3) Membership renewal every 5 years.
 (4) Additional financial support due to a spill case occurrence oversea.
 (5) Membership fees depended on corporate total revenue in financial statement of the past two years.
 (6) Membership fees of the Federation of Thai Industries in 2021 – 2022, there is no company membership fee for Thai Oil Power Co., Ltd. due to termination of business, however it includes membership fees as an associate member of subsidiaries within Thaioil Group.

Occupational Health and Safety Performance ^{(1), (2)}	Unit	2019		2020		2021		2022	
		Male	Female	Male	Female	Male	Female	Male	Female
Total hours worked	Hour	2,861,233		2,887,982		2,887,293		2,952,468.04	
• Employees		2,632,203	229,030	2,625,891	262,091	2,433,255	454,038	2,516,078.26	436,389.78
Total hours worked ⁽⁶⁾	Hour	18,870,649		18,085,177		13,554,027		18,890,846.19	
• Contractors		16,409,274	2,461,376	14,524,263	3,560,914	10,981,250	2,572,777	8,470,709.56	10,420,136.63
Work-Related Injuries⁽³⁾									
Fatality as a result of work-related injury	Case	0		0		0		0	
• Employees	Case / Million work hours	0	0	0	0	0	0	0	0
Fatality as a result of work-related injury	Case	0		0		1		0	
• Contractors	Case / Million work hours	0	0	0	0	0.07		0	
Total recordable work-related injury rate (TRIR)	Case	2		2		1		1	
• Employees	Case / Million work hours	0.7		0.69		0.35		0.34	
Total recordable work-related injury rate (TRIR)	Case	6		4		4		6	
• Contractors	Case / Million work hours	0.32		0.22		0.30		0.32	
Lost-time injury frequency rate (LTIFR)	Case	1		0		0		0	
• Employees	Case / Million work hours	0.35		0		0		0	

 Occupational Health and Safety Performance ^{(1), (2)}	Unit	2019		2020		2021		2022	
		Male	Female	Male	Female	Male	Female	Male	Female
Lost-time injury frequency rate	Case	2		1	0	1		3	
• Contractors		2	0	1	0	0	1	2	1
	Case / Million work hours	0.11		0.06		0.07		0.16	
		0.12	0	0.07	0	0	0.39	0.24	0.10
Near misses ⁽⁴⁾	Case	3,418		4,521		6,594		7,601	
• Employees and Contractors									
Work-Related Illnesses									
Fatality as a result of work-related ill health	Case	0		0		0		0	
• Employees		0	0	0	0	0	0	0	0
Fatality as a result of work-related ill health	Case	0		0		0		0	
• Contractors		0	0	0	0	0	0	0	0
Occupational illness frequency rate (ORF)	Case	0		0		0		0	
• Employees		0	0	0	0	0	0	0	0
	Case / Million work hours	0	0	0	0	0	0	0	0
Occupational illness frequency rate (ORF)	Case	0		0		0		0	
• Contractors		0	0	0	0	0	0	0	0
	Case / Million work hours	0	0	0	0	0	0	0	0
Process Safety ⁽⁵⁾									
Process safety events – Tier 1	Event	2		1		1		1	
	Event / Million work hours	0.09		0.04		0.06		0.05	
Process safety events – Tier 2	Event	0		1		2		2	
	Event / Million work hours	0		0.04		0.12		0.09	

Remarks:

- (1) Thaioil Group applied statistical reporting standard of PTT Group in line with Occupational Safety and Health Administration (OSHA).
- (2) Thaioil Group presented occupational health and safety statistics with a breakdown of employees and contractors to indicate the Group's social responsibility towards operational contractors.
- (3) First aid injuries are excluded in the accident record.
- (4) Thaioil Group combined 'Potential Incident Report (PRI)' together with the Near misses (Please see more in Human Health and Safety chapter).
- (5) Thaioil Group reported process safety in accordance with API RP 754.
- (6) Total worked hours of contractors include the working hours of customer's contractors (tanker truck drivers) while working in the lorry loading area as per scope of Thaioil's operational boundary.

 People ⁽⁶⁾	Unit	2019		2020		2021		2022		
		Male	Female	Male	Female	Male	Female	Male	Female	
GRI 405-1 Employees ⁽¹⁾										
Total number of employees										
	Person	1,637		1,749		1,799		1,851		
		1,222	415	1,329	420	1,351	448	1,369	482	
	Percent	75	25	76	24	75	25	74	26	
Number of Employees by Level										
All Employees										
• Executives ⁽³⁾	Person	9	1	9	2	10	2	11	2	
	Percent	90	10	82	18	83	17	85	15	
• Management ⁽⁴⁾	Person	94	63	90	64	93	69	102	77	
	Percent	60	40	58	42	57	43	57	43	
• Non-management	Person	1,119	351	1,230	354	1,248	377	1,256	403	
	Percent	76	24	78	22	77	23	76	24	
Permanent Contract										
• Executives ⁽³⁾	Person	8	0	8	1	8	1	9	1	
• Management ⁽⁴⁾	Person	90	60	87	61	90	66	101	75	

People ⁽⁶⁾	Unit	2019		2020		2021		2022									
		Male	Female	Male	Female	Male	Female	Male	Female								
• Non-management	Person	1,118	351	1,229	354	1,248	376	1,256	402								
Temporary Contract ⁽⁷⁾																	
• Executives ⁽³⁾	Person	1	1	1	1	2	1	2	1								
• Management ⁽⁴⁾	Person	4	3	3	3	3	3	1	2								
• Non-management	Person	1	0	1	0	0	1	0	1								
Number of Employees by Age Group ⁽¹⁾																	
• Below 30 years old	Person	374	70	492	79	471	83	438	81								
• 30-50 years old	Person	554	284	524	278	545	301	591	338								
• Over 50 years old	Person	294	61	313	63	335	64	340	63								
Number of Employees by Area of work																	
Permanent Contract																	
• Depot	Person	2	0	2	1	2	1	2	1								
• Bangkok office	Person	52	145	53	143	54	151	82	185								
• Si Racha office (Thaioil refinery)	Person	1,162	266	1,269	272	1,290	291	1,285	296								
Temporary Contract ⁽⁷⁾																	
• Depot	Person	0	0	0	0	0	0	0	0								
• Bangkok office	Person	4	4	3	4	4	5	3	4								
• Si Racha office (Thaioil refinery)	Person	2	0	2	0	1	0	0	0								
ATTRACTION																	
GRI 401-1 New Employees Hired ⁽¹⁾																	
Total number of new employees hired	Person	197		148		94		99									
		166	31	127	21	54	40	51	48								
Number of New Employees by Level																	
• Executives ⁽³⁾	Person	1	0	0	0	1	1	0	0								
• Management ⁽⁴⁾	Person	3	1	0	2	2	0	0	0								
• Non-management	Person	162	30	127	19	51	39	41	48								
Number of New Employees by Level																	
• Below 30 years old	Person	157	18	122	14	45	27	41	31								
• 30-50 years old	Person	8	13	5	7	8	12	10	17								
• Over 50 years old	Person	1	0	0	0	1	1	0	0								
Number of Employees by Religion ⁽¹⁰⁾																	
• Buddhism	Percent	97.80		97.88		97.61		95.73									
• Christianity	Percent	1.22		1.14		1.22		1.19									
• Islam	Percent	0.92		0.91		1.11		1.03									
• Atheism	Percent	0.06		0.06		0.06		0.05									
• Not specified	Percent							2.00									
Total new hire rate	Percent of total number of employees	12.03		8.46		5.23		5.35									
		13.58	7.47	9.56	5.00	4.00	8.93	3.73	9.96								
Ability to recruit employees	Percent of total number of open positions	100		100		90		92									
Cost of new employee recruitment	THB / FTE	48,000		42,000		36,000		54,000									
RETENTION																	
GRI 401-1 Employee Turnover ^{(1), (6)}																	
Total employee turnover	Person	40		47		49		92									
		32	8	30	17	37	12	60	32								
• Below 30 years old	Person	8	3	6	6	12	2	19	10								
• 30-50 years old	Person	6	4	4	4	5	4	6	15								
• Over 50 years old	Person	18	1	20	7	20	6	35	7								
Turnover rate	Percent of number of total employees	2.44		2.69		2.72		4.97									
		2.62	1.93	2.26	4.05	2.74	2.68	4.38	6.64								
Voluntary resignation rate	Percent of number of total employees	1.16		1.03		1.17		2.81									
		1.06	1.45	0.60	2.38	1.11	1.34	1.90	5.39								

People ⁽⁶⁾	Unit	2019		2020		2021		2022	
		Male	Female	Male	Female	Male	Female	Male	Female
DJSI 3.5.8 Employee Engagement									
Employee engagement score	Percent	90		92		94		89	
		94	92	91	94	95	92	81	89
Employee Engagement by Employees by Level									
• Executives ⁽³⁾	Percent							100	
• Management ⁽⁴⁾	Percent							83	
• Non-management	Percent							92	
Employee Engagement by Age Group									
• Below 30 years old	Percent							66	
• 30-50 years old	Percent							91	
• Over 50 years old	Percent							92	
GRI 401-3 Parental Leave ⁽⁸⁾									
Total number of employees that took parental leave	Person	36		37		47		43	
		17	19	22	15	33	14	26	17
Total number of employees that return to work after taking parental leave	Person	36		37		47		43	
		17	19	22	15	33	14	26	17
Rate of employees that returned to work after parental leave ended	Percent of employees who took parental leave	100		100		100		100	
		100	100	100	100	100	100	100	100
DEVELOPMENT									
GRI 404-1 Average Training Hours ^{(1), (2), (10)}									
Total training hours	Hour	124,222		94,716		103,102		124,421	
		100,030	24,192	78,454	16,262	82,920	20,182	103,117	21,303
Average training hours of all employees	Hour / FTE / Year	81	58	59	39	57	46	68	45
• Executives ⁽³⁾	Hour / FTE / Year	94	687	138	201	157	47	83	47
• Management ⁽⁴⁾	Hour / FTE / Year	71	69	46	54	56	57	74	74
• Non-management	Hour / FTE / Year	82	54	60	37	56	43	67	39
Average Training & Development by Hours and Costs ⁽¹⁰⁾									
Average training hours and costs by all types of training	Hour					293		316	
	THB / FTE					266,344		296,488	
Average Training & Development hours and costs by Type of Training ⁽¹⁰⁾									
• Classroom Training	Hour					54		62	
	THB / FTE					10,454		15,288	
• Coaching and On the Job Training	Hour					221		233	
	THB / FTE					251,280		275,540	
• Online Training	Hour					18		21	
	THB / FTE					4,610		5,660	
Average Training Hours and Costs by Age Group ⁽¹⁰⁾									
• Below 30 years old	Hour					275		294	
	THB / FTE					265,575		298,760	
• 30-50 years old	Hour					284		302	
	THB / FTE					270,529		301,386	
• Over 50 years old	Hour					253		281	
	THB / FTE					255,996		284,828	
Average Training Hours and Costs by Employee Level ⁽¹⁰⁾									
• Executives ⁽³⁾	Hour					327		331	
	THB / FTE					292,765		301,287	
• Management ⁽⁴⁾	Hour					270		278	
	THB / FTE					266,067		277,644	
• Non-management	Hour					275		281	
	THB / FTE					265,873		298,495	

People ⁽⁶⁾	Unit	2019		2020		2021		2022	
		Male	Female	Male	Female	Male	Female	Male	Female
Individual Development Plan									
Employees who developed Individual Development Plan (IDP)	Percent	100		100		100		100	
IDP Progress	Percent	90		100		100		100	
Employees with plans on Career Path	Percent	98		98		99		99	
HUMAN RIGHTS									
GRI 405-2: Gender Pay Ratio between Women and Men ⁽⁹⁾									
Executives ⁽³⁾ (Base salary only)	Average THB/Person							6,674,000	6,048,000
Executives ⁽³⁾ (Base salary and other cash incentives)	Average THB/Person							10,787,000	10,180,000
Management ⁽⁴⁾ (Base salary only)	Average THB/Person							2,227,000	1,937,000
Management ⁽⁴⁾ (Base salary and other cash incentives)	Average THB/Person							3,743,000	3,231,000
Non-management (Base salary only)	Average THB/Person							582,000	612,000
Non-management (Base salary and other cash incentives)	Average THB/Person							1,095,000	1,117,000
Executives ⁽³⁾ (Base salary only)	Ratio of average salary of women to men							0.91	
Executives ⁽³⁾ (Base salary and other cash incentives)	Ratio of average salary of women to men							0.94	
Management ⁽⁴⁾ (Base salary only)	Ratio of average salary of women to men							0.87	
Management ⁽⁴⁾ (Base salary and other cash incentives)	Ratio of average salary of women to men							0.86	
Non-management (Base salary only)	Ratio of average salary of women to men							1.05	
Non-management (Base salary and other cash incentives)	Ratio of average salary of women to men							1.02	
Employee Grievance									
Number of human rights grievances	Case	0		0		0		0	
• Resolved grievances	Case	0		0		0		0	
• Grievances under investigation	Case	0		0		0		0	
Number of labour practice grievances	Case	0		0		0		0	
• Resolved grievances	Case	0		0		0		0	
• Grievances under investigation	Case	0		0		0		0	
Labour Union ⁽⁶⁾									
Number of employees in the Labour Union	Percent	73.83		74.65		75.24		75	

Remarks:

- (1) Included data of the employee assigned from external organizations, both permanent contract and temporary contract
- (2) Excluded data from the educational scholarship funded by ThaiOil Group
- (3) The executives consist of CEO, President, and Executive Vice President
- (4) The managements consist of Vice President and Section Manager.
- (5) Turnover rate includes voluntary resignation, retirement, asked resignation, employee laid off, and fatality.
- (6) Scope of reporting includes only ThaiOil Public Company Limited.
- (7) Employees on temporary contract are full-time employees as ThaiOil Group does not hire part-time employees.
- (8) Female employees have 98 days of parental leave with 60 days of paid parental leave, which is higher than Thailand Labor Law, required 45 days. Male employees have 12 days of parental leave, which is also higher than the Labor Law, required 3 days.
- (9) Ratio of average salary of women to men is verified by an independent third party according to GRI Standard 405-2 (Details of Assurance Statement on page 132-133).
- (10) FTE or Full Time Equivalent is the number of working hours per a full-time employee per year.

 Society and Community Development	Unit	2019	2020	2021	2022
Percentage of operations with employee engagement activities, impact assessments, and/or community development programs	Percent	100	100	100	100
Number of visits at Thaioil Group's Health and Education Centre	Visit	69,324	53,642	22,223	32,114
Community engagement score	Percent	93.32	94.89	96.74	95.85
Number of employee volunteer hours	Hour	10,416	16,470	12,488	6,450
Value of employee volunteering during paid hours	Million THB	6.5	12.4	5.12	4.61
Cost of management	Million THB	24	33	31	36

 Supply Chain Management	Unit	2019	2020	2021	2022
GRI 102-9: Type of Supplier					
Total tier 1 suppliers	Number of suppliers	1,075	1,095	1,086	1,031
Total tier 1 suppliers undergone preliminary ESG risk assessment	Percent	100	100	100	100
Critical tier 1 suppliers	Number of suppliers	57	53	46	42
Critical non-tier 1 suppliers	Number of suppliers	13	11	12	15
Critical non-tier 1 suppliers undergone preliminary ESG risk assessment	Percent	100	100	100	100
Supplier Risk					
Tier 1 suppliers with high sustainability risk	Number of suppliers	17	22	22	14
	Percent	1.58	2.01	2.03	1.36
Critical non-tier 1 suppliers with high sustainability risk	Number of suppliers	0	0	0	0
	Percent	0	0	0	0
In-depth Supplier Risk Assessment ⁽¹⁾					
Percentage of total tier 1 suppliers with high sustainability risk undergone in-depth risk assessment annually	Percent	0	0	9.09	14.28
Percentage of total tier 1 suppliers with high sustainability risk undergone in-depth risk assessment every 3 years	Percent	52.94	95.50	81.82	71.43
Percentage of critical tier 1 and critical non-tier 1 undergone in-depth sustainability risk assessment annually	Percent	0	0	0	0
Percentage of critical tier 1 and critical non-tier 1 undergone in-depth sustainability risk assessment every 3 years	Percent	30.00	57.69	84.48	86.27
Percentage of suppliers audited with Corrective Action Plan	Percent	100	100	100	100
GRI 308-1 and GRI 414-1 Suppliers					
New suppliers screened with social and environmental criteria	Percent	100	100	100	100
Ocean loss index	Percent by volume	0.18	0.16	0.21 ⁽²⁾	0.33 ⁽³⁾
Supplier satisfaction score	Percent	93	94	93	98

Remarks:

- (1) Tier 1 suppliers included only in the Company's approved list; crude oil suppliers were excluded.
 (2) New crude oil tanks operated and tested pumping system in May 2021.
 (3) Due to the increasing of crude oil for production plan, this in turn increases the likelihood of % loading loss at the port of origin.

 Customer Responsibility Management	Unit	2019	2020	2021	2022
GRI 308-1 and GRI 414-8 Customers					
Customer engagement index ⁽¹⁾	Percent	96	98	94	95

Remarks:

- (1) The reported data included customers of Thai Oil Public Company Limited, Thai Lube Base Public Company Limited, and Thai Paraxylene Company Limited.

Environmental Performance	Unit	2019	2020	2021	2022
Refinery throughput ⁽¹⁾	Metric Ton	14,600,280	13,478,448	13,664,652	14,294,851
Energy and chemicals production	Million barrels of crude oil equivalents: MBOE ⁽¹²⁾	105	98	97	104
Environment-Related Expenditure					
Capital investment on energy efficiency improvement	Million THB	28.00	57.40	425	13.14
Investment benefits ⁽¹¹⁾	Million THB	309	112	65	74
Energy Management and Greenhouse Gases ^{(2), (4)}					
Total energy consumption ⁽²⁾	Million GJ	50.32	44.66	47.18	47.34
Non-renewable energy consumption	Million GJ	56.01	50.26	52.76	52.74
	Megawatt-Hour	15,557,695	13,961,144	14,655,500	14,649,441
Refinery energy intensity	GJ/BOE ⁽¹²⁾	0.48	0.46	0.49	0.45
Total fuel consumption ⁽²⁾	Million GJ	56.01	50.26	52.76	52.74
Refinery fuel consumption intensity	GJ/BOE ⁽¹²⁾	0.53	0.51	0.54	0.51
• Natural gas	Million GJ	36.39	33.10	33.32	34.43
• Fuel oil	Million GJ	2.91	5.20	4.30	4.27
• Fuel gas	Million GJ	15.39	10.85	14.07	12.87
• Coke	Million GJ	1.28	1.09	1.04	0.98
• LPG	Million GJ	Less than 0.01	Less than 0.01	Less than 0.01	Less than 0.01
• Diesel	Million GJ	0.029	0.021	0.016	0.019
• Benzene	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	987,424	972,237	980,290	1,059,335
	Million GJ	3.55	3.50	3.53	3.81
Electricity purchased from external source	Megawatt-Hour	0	0	0	0
Electricity sold ⁽⁴⁾	Megawatt-Hour	1,580,492	1,556,176	1,548,619	1,499,678
Energy consumption reduction	GJ	1,396,728	762,264	312,741	138,473
Investments in renewable energy	Million THB	1,374	1,442	1,413	1,624
Direct greenhouse gas emissions (Scope 1) ⁽³⁾	Million tons CO ₂ equivalents	3.31	3.03	3.15	3.26
• Stationary combustion	tons CO ₂ equivalents				3,262,488
• Mobile Combustion	tons CO ₂ equivalents				1,516
• Fugitive emission	tons CO ₂ equivalents				0
• Process (Electricity distributions system/ Refrigerant-Cooling system/Fire extinguisher)	tons CO ₂ equivalents				0
Indirect greenhouse gas emissions (Scope 2) ⁽³⁾	tons CO ₂ equivalents	0	0	0	0
Greenhouse gas emission intensity (Scope 1 and 2)	tons CO ₂ equivalents / BOE ⁽¹²⁾	0.0316	0.0309	0.0324	0.0314
Greenhouse gas emission reduction (Scope 1) as a result of energy efficiency improvement projects	tons CO ₂ equivalents	84,265	51,084	17,545	16,759
Methane emission	Ton	61.59	60.73	61.20	63.39
	Percent of gross direct GHG emissions (Scope 1)	0.047	0.050	0.049	0.058
Indirect greenhouse gas emission (Scope 3) ⁽³⁾					
• Suppliers: landfilling industrial waste	tons CO ₂ equivalents	1,014	0	0	0
• Suppliers: crude oil losses during marine transportation	tons CO ₂ equivalents	1,268	1,346	1,573	2,751
• Customers: finished oil product	Million tons CO ₂ equivalents	27.2	26.5	26.8	27.3

Environmental Performance		Unit	2019	2020	2021	2022
Air Emission ^{(5), (6)}						
• Nitrogen oxide emissions (NO _x)	Ton	4,360	4,526	4,527	4,426	
• Sulphur oxide emissions (SO _x)	Ton	4,272	6,612	5,197	6,542	
• Volatile organic compound emissions (VOC _s)	Ton	1,348	1,297	1,270	1,275	
Waste Management						
Total waste generated	Ton			5,889	11,250	
Total waste generated and managed	Ton	14,916	10,820	5,862	10,950	
• Hazardous waste generated	Ton	12,452	8,201	5,078	9,586	
• Non-hazardous waste generated	Ton	2,464	2,619	784	1,364	
Total waste leftover onsite at the end of the year	Ton			27	327	
• Total hazardous waste leftover onsite at the end of the year	Ton			25	68	
• Non-hazardous waste leftover onsite at the end of the year	Ton			2	259	
Total waste diverted from disposal	Ton	13,923	10,786	5,856	10,950	
Onsite	Ton	0	0	0	0	
Total hazardous waste utilized	Ton	0	0	0	0	
• By reusing	Ton	0	0	0	0	
• By recycling	Ton	0	0	0	0	
• Other ⁽⁷⁾	Ton	0	0	0	0	
Total non-hazardous waste utilized	Ton	0	0	0	0	
• By reusing	Ton	0	0	0	0	
• By recycling	Ton	0	0	0	0	
• Other ⁽⁷⁾	Ton	0	0	0	0	
Offsite	Ton	13,923	10,786	5,856	10,950	
Total hazardous waste utilized	Ton	11,787	8,167	5,078	9,586	
• By reusing	Ton	0	0	0	0	
• By recycling	Ton	4,615	1,312	944	1,084	
• Other ⁽⁷⁾	Ton	7,173	6,855	4,134	8,502	
Total non-hazardous waste utilized	Ton	2,136	2,619	778	1,364	
• By reusing	Ton	0	0	0	0	
• By recycling	Ton	2,086	2,448	432	441	
• By recycling as alternative energy	Ton	49	171	346	923	
• Other ⁽⁷⁾	Ton	0	0	0	0	
Total waste disposed	Ton	993	34	6	0	
Onsite	Ton	0	0	0	0	
Total hazardous waste disposed	Ton	0	0	0	0	
• By incineration with energy recovery	Ton	0	0	0	0	
• By incineration without energy recovery	Ton	0	0	0	0	
• Landfill	Ton	0	0	0	0	
• Other ⁽⁷⁾	Ton	0	0	0	0	
Total non-hazardous waste disposed	Ton	0	0	0	0	
• By incineration with energy recovery	Ton	0	0	0	0	
• By incineration without energy recovery	Ton	0	0	0	0	
• Landfill	Ton	0	0	0	0	
• Other ⁽⁷⁾	Ton	0	0	0	0	
Offsite	Ton	993	34	6	0	
Total hazardous waste disposed	Ton	665	34	0	0	
• By incineration with energy recovery	Ton	0	0	0	0	
• By incineration without energy recovery	Ton	427	6	0	0	
• Landfill	Ton	237	0	0	0	
• Other ⁽⁷⁾	Ton	0	28	0	0	
Total non-hazardous waste disposed	Ton	328	0	6	0	
• By incineration with energy recovery	Ton	0	0	6	0	
• By incineration without energy recovery	Ton	133	0	0	0	

Environmental Performance		Unit	2019	2020	2021	2022
• Landfill	Ton	195	0	0	0	0
• Other ⁽⁷⁾	Ton	0	0	0	0	0
Oil and Chemical Spill ⁽⁸⁾						
Significant oil and chemical spills on land	Case	0	0	0	0	0
Significant oil and chemical spills in the sea	Case	0	0	0	0	0
Environmental Laws and Regulations Compliance						
Fines for non-compliance with environmental laws and regulations	Million THB	0	0	0	0	0
Number of non-compliance with environmental laws and regulations incidents	Incident	0	0	0	0	0

Environmental Performance	Unit	Water					Water in water stress areas
		2019	2020	2021	2022	2023	
Water ⁽⁹⁾							
Water withdrawal by source	Total seawater ⁽¹⁰⁾	Million m ³	17.96	18.41	18.19	18.19	NAP
	• Freshwater (≤ 1,000 mg/L Total Dissolve Solids)	Million m ³	0	0	0	0	NAP
	• Other water (> 1,000 mg/L Total Dissolve Solids)	Million m ³	17.96	18.41	18.19	18.19	NAP
	Total water withdrawal from other sources	Million m ³	4.86	3.34	3.88	3.67	NAP
	• Freshwater (≤ 1,000 mg/L Total Dissolve Solids)	Million m ³	4.86	3.34	3.88	3.67	NAP
	• Other water (> 1,000 mg/L Total Dissolve Solids)	Million m ³	0	0	0	0	NAP
	Total third-party water withdrawal by source	Million m ³	4.86	3.34	3.88	3.67	NAP
	Surface water	Million m ³	0	0	0	0	NAP
	Groundwater	Million m ³	0	0	0	0	NAP
	Seawater	Million m ³	0	0	0	0	NAP
	Produced water	Million m ³	0	0	0	0	NAP
Water withdrawal	From all water sources	Million m ³	22.82	21.75	22.07	21.86	NAP
Water discharge by destination ⁽¹⁰⁾	Discharged into the sea	Million m ³	18.13	17.43	18.10	18.74	NAP
Total water discharge ⁽¹⁰⁾	All discharge destinations	Million m ³	18.13	17.43	18.10	18.74	NAP
Total water discharge by treatment level	Freshwater (≤ 1,000 mg/L Total Dissolve Solids)	Million m ³	0	0	0	0	NAP
	Other water (> 1,000 mg/L Total Dissolve Solids)	Million m ³	18.13	17.43	18.10	18.74	NAP
Water consumption for industrial purposes	Total water consumption	Million m ³	4.69	4.32	3.97	3.11	NAP
	Total net freshwater consumption in water-stressed areas	Million m ³	NAP	NAP	NAP	NAP	NAP

Remarks:

- Refinery Throughput includes crude oil and other refinery feedstock.
- Energy consumption covered TOP, TPX, TLB LABIX and TOP SPP. The amount of fuel, steam, and electricity was calculated in accordance with GRI 302 (2016). The energy conversion factors were specific values gathered from Thaioil Group and subsidiaries' laboratory.
- Thaioil Group follows PTT Group's statistical reporting standard that is in line with the WBCSD Greenhouse Gas Protocol, which covers carbon dioxide, methane, and nitrous oxide.
- There was no steam sold to external organizations.
- Thaioil Group operated, evaluated, and monitored occupational health and safety and environmental performance by following Shell International Practice Standard (2007).
- Thaioil Group does not purchase ozone-depleting chemicals, such as CFCs, HCFCs, Halons, and Methyl Bromide.
- The other waste disposal methods included external wastewater treatment.
- Oil and chemical spills that are greater than 1 Barrel to sea and 100 Barrels to land was considered as significant.
- Data excluded water consumption in the office building as the amount is very small compared to water consumed in the production process. Therefore, it can be considered as insignificant.
- The amount of seawater withdrawal and water discharge covered excess seawater that has been discharged as freshwater by desalination process from the desalination unit.
- Investment benefits included cost saving from environmental-related activities and tax benefits.
- Barrel Oil Equivalent means the production amount of petroleum and petrochemical product equivalent to 1 Barrel of crude oil.

AWARDS AND RECOGNITIONS

Member of Dow Jones Sustainability Indices
Powered by the S&P Global CSA

Thaioil was recognized as a member of DJSI 2022 for the 10th consecutive year and achieved the highest sustainability score in Oil & Gas Refining and Marketing industry for the 7th year

10th December 2022
Thai Oil Public Company Limited was recognized as a member of the Dow Jones Sustainability Indices (DJSI) for 10th consecutive years and achieved the highest sustainability score in Oil & Gas Refining and Marketing industry for the seventh year. This reflects Environmental, Social, as well as Governance and Economic recognition at the international level.

Sustainability Award
Silver Class 2022
S&P Global

Thaioil was globally recognized as one of the leading companies in sustainability by 2022 S&P Global Sustainability Award

8th February 2022
Thai Oil Public Company Limited was awarded "Silver Class" status recognition in Oil & Gas Refining and Marketing industry in 2022 S&P Sustainability Award, reflecting professional competence in business. The Company has continuously embedded the ESG principles in the business operation.

THAILAND TOP COMPANY AWARDS 2022

Thaioil was awarded Thailand Top Company Award 2022 as "TOP Management Award"

12th May 2022
Thai Oil Public Company Limited was awarded Thailand Top Company Award 2022 as the "Top Management Award" given to the organization with outstanding performance in terms of organizational transformation and financial performance. This award aims to honor Thai businesses presenting leadership thoughts and best practices to the other businesses.

Thaioil was awarded the "2022 CSR-DIW Continuous Award" for the 14th consecutive year

24th August 2022
Thai Oil Public Company Limited was awarded the "2022 CSR-DIW Award" in the category of CSR-DIW Continuous for the 14th consecutive year. The award is organized by the Department of Industrial Works, Ministry of Industry.

Thaioil was listed as one of the 2022 "sustainable stocks" in Thailand Sustainability Investment (THSI) for the 8th consecutive year

12th October 2022
Thai Oil Public Company Limited was listed as one of the companies that give sustainable returns for the eighth consecutive year by the Stock Exchange of Thailand. This reflects the effort of the Company in sustainable business development and the resilient ability to create business opportunities in respond to future challenges, and to become the 100-year sustainable organization.

Thaioil received three awards from 2022 ASEAN Corporate Governance Scorecard

8th December 2022
Thai Oil Public Company Limited received three awards from the 2022 ASEAN Corporate Governance Scorecard, namely, ASEAN Top 20 PLCs award, Country TOP 3 (Thailand) award, and ASEAN Asset Class Publicly Listed Companies award.

Thaioil was awarded the SET Awards "2022 Sustainability Award of Honor" for the 5th consecutive year

28th October 2022
Thai Oil Public Company Limited was awarded the 2022 SET Awards in the Sustainability Awards for the Honor category as the Sustainability Excellence awards, marking the fifth consecutive year of the recognition. This award is given by the Stock Exchange of Thailand and the Money & Banking magazine.

Thaioil was awarded the "Strongest Commitment to Sustainable Energy in Southeast Asia" Award for the 10th consecutive year

25th August 2022
Thai Oil Public Company Limited was awarded "Strongest Commitment to Sustainable Energy in Southeast Asia" for the tenth consecutive year from Alpha Southeast Asia. In addition, the Company received three national awards, namely, "The Most Consistent Dividend Policy" Award, "The Strongest Adherence to Corporate Governance" Award, and "The Most Organized Investor Relations" Award.

Thaioil was awarded "Sustainability Disclosure Award 2022 – Award of Honor" for the 4th consecutive year

21st December 2022
Thai Oil Public Company Limited was awarded the "Sustainability Disclosure Award 2022" for the fourth consecutive year at the Sustainability Disclosure Award ceremony organized by Thaipat Institute.



LRQA Independent Assurance Statement

Relating to Thai Oil Public Company Limited's Environmental and Social Disclosures within the Integrated Report for the calendar year 2022

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

LRQA was commissioned by Thai Oil Public Company Limited (TOP) to provide independent assurance on the environmental and social disclosures within its Integrated Report 2022 ("the Report") against the assurance criteria below to a limited level of assurance and at the materiality of the professional judgement of the verifier using LRQA's verification procedure. LRQA's verification procedure is based on current best practice, is in accordance with ISAE 3000 and ISAE 3410 and uses the following principles of - inclusivity, materiality, responsiveness and reliability of performance data.

Our assurance engagement covered TOP's operations and activities in Chonburi, Thailand, including five subsidiary companies i.e., Thai Lube Base Public Company Limited, Thai Paraxylene Company Limited, Thaioil Energy Services Company Limited, LABIX Company Limited, and TOP SPP Company Limited 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, based on the latest version of the GRI standard applicable to the selected environmental and social disclosures listed below:
 - Environmental: GRI disclosure 302-1, 303-3, 303-4, 305-1, 305-2, 305-7, 306-3 (2016), 306-3, 306-4, 306-5
 - Social: GRI disclosure 403-9a and 403-9b, 403-10a and 403-10b, and 405-2

Note: For safety performance data (disclosure 403-9, 403-10), it also covered TOP's operations and activities in Bangkok, and expansion projects within Sriracha area.

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, in all material respects:

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

Observations

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

- Stakeholder inclusivity: TOP has continued to maintain its established stakeholder engagement processes as part of business as usual. We believe TOP should engage with other parties, such as NGOs who represent minority groups, to obtain their needs and expectations. These needs and expectations may affect TOP's future operations, such as plans for the new refinery.
- Materiality: TOP has improved their methodology of assessing materiality. This has led to a more effective validation process and therefore reported material topics are also more reliable. Another benefit of the improvement was TOP refocused and clarified their efforts in setting a right policy and commitment.
- Responsiveness: TOP has implemented key performance indicators within their group to address stakeholders' needs and expectations. For example: Energy Intensity Index contributes towards GHG reduction by reporting on energy reduction projects. However, we believe KPI targets should be proactive rather than reactive in future TOP Integrated Reports.
- Reliability: TOP has established and maintained, at an aggregated level, a consistent data collection system. However, to improve data accuracy we believe that TOP should address the QA/QC system focusing on datasets that are complex and involve manual data transposition. For example: the GHG and Energy Inventory.

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 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 1 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.



Nit Tanasuthisari
LRQA Lead Verifier

Dated: 16 February 2023

On behalf of LRQA Ltd.
LRQA (Thailand) Limited
No. 9, G Tower Grand Rama 9, FL. 30, Room H14,
Rama 9 Rd., Huaykwang, Bangkok 10310 THAILAND

LR reference: BGK56473521305546

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	GRI 306: Effluents and Waste 2016	306-3	11.8.2	46		Yes
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	GRI 305: Emissions 2016	305-7	11.3.2	49		Yes

Topic Specific Disclosure

Thaioil Sustainability Material Topics	GRI Topics	Disclosures	GRI SECTOR STANDARD 11	Page or Website	Comments/ Omissions	External Assurance
Net Zero GHG Emissions, and Air Quality Management	GRI 3: Management of Material Topics GRI 201: Economic Performance 2016 GRI 303: Water and Effluents 2018 GRI 305: Emissions 2016	3-3 201-2 303-2 305-1 305-2 305-3 305-4 305-5	- 11.2.2 11.6.3 11.1.5 11.1.6 11.1.7 11.1.8 11.2.3	50 52-56 55-56 57, 127 57, 127 57-59, 127-128 57, 127 56-59, 127		
	GRI: Sector Standard: Oil and Gas 2021 (Additional Sector Disclosure)	N/A	11.2.4	N/A	Thaioil Group aligns our climate change commitment with Thailand's net zero targets.	
Circular Economy	GRI 3: Management of Material Topics	3-3	11.1.1 11.5.1 11.6.1	61 61 61		
	GRI 302: Energy 2016	302-1	11.1.2	64, 127	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
		302-3 302-4 302-5	11.1.4 N/A N/A	63-64, 127 63-64, 127 63-64, 127		
	GRI 303: Water and Effluents 2018	303-1 303-2 303-3 303-4 303-5	11.6.2 11.6.3 11.6.4 11.6.5 11.6.6	61-62 62, 129 62, 129 62, 129 62, 129	The standard, methodologies and consumptions used to calculate water withdrawal are not reported.	Yes
	GRI 306: Waste 2020	306-1 306-2 306-3 306-4 306-5	11.5.2 11.5.3 11.5.4 11.5.5 11.5.6	66-67 66-67 67, 128-129 67, 128-129 67, 128-129		Yes
Diversity, Inclusion, and Equal Opportunities	GRI 3: Management of Material Topics GRI 402: Labour Management Relations 2016	3-3 402-1	11.11.1 11.10.5	70 73, 125		
	GRI 405: Diversity and Equal Opportunity 2016	405-1 405-2	N/A 11.11.5	122-123 125		Yes
	GRI 406: Non-discrimination 2016	406-1	11.11.6	75, 125		
	GRI 409: Forced or Compulsory Labor 2016	409-1	11.12.2	70-71		
	GRI 412: Human Rights Assessment 2016	412-1	N/A	72		
	GRI 414: Supplier Social Assessment 2016	414-1	11.12.3	72, 126		
Human Health and Safety	GRI 3: Management of Material Topics GRI: Sector Standard: Oil and Gas 2021 (Additional Sector Disclosure)	3-3 OG13	11.8.1 11.9.1 11.8.3 & 11.8.4	76 76 82, 122		
	GRI 403: Occupational Health and Management System 2018	403-1 403-2 403-3 403-4 403-5 403-6 403-7 403-8 403-9 403-10	11.9.2 11.9.3 11.9.4 11.9.5 11.9.6 11.9.7 11.9.8 11.9.9 11.9.10 11.9.11	76-77 78-79 78-79 78-79 78-79 72, 78-79 78-79, 81-82 78-79 80, 121 80, 122		Yes Yes

Topic Specific Disclosure

Thaioil Sustainability Material Topics	GRI Topics	Disclosures	GRI SECTOR STANDARD 11	Page or Website	Comments/ Omissions	External Assurance
Human Capital Development, and Employee Retention / Talent Attraction	GRI 3: Management of Material Topics	3-3	11.10.1	84-85		
	GRI 401: Employment 2016	401-1	11.10.2	85, 123		
		401-2	11.10.3	72		
		401-3	11.10.4	124		
	GRI 404: Training and Education 2016	404-1	11.10.6	88, 124		
		404-2	11.10.7	86-87		
		404-3	11.10.8	89, 125		
	GRI 3: Management of Material Topics	3-3	11.14.1	90		
	GRI 203: Indirect Economic Impacts 2016	203-1	11.14.4	92		
	GRI 413: Local Communities 2016	413-1	11.15.2	92		
Creating Positive Impact to Communities and Society	GRI: Sector Standard: Oil and Gas 2021 (Additional Sector Disclosure)	N/A	11.15.4	75		
	GRI 3: Management of Material Topics	3-3	11.20.1	27		
	GRI 205: Anti-Corruption 2016	205-1	11.20.2	35		
		205-2	11.20.3	35-36		
		205-3	11.20.4	34		
Corporate Governance & Business Code of Conduct	GRI: Sector Standard: Oil and Gas 2021 (Additional Sector Disclosure)	N/A	11.20.5	N/A	Not applicable to Thaioil Group as the Company does not engage in oil drilling activities.	
		N/A	11.20.6	N/A		
	GRI 3: Management of Material Topics	3-3	N/A	107		
	GRI 3: Management of Material Topics	3-3	N/A	1, 22-26		
	GRI 3: Management of Material Topics	3-3	N/A	100		
Digital Transformation	GRI 3: Management of Material Topics	3-3	11.12.1	111		
	GRI 308: Supplier Environmental Assessment 2016	308-1	N/A	115, 126		
		308-2	N/A	115, 126		
	GRI 409: Forced or Compulsory Labor 2016	409-1	11.12.2	115, 126		
	GRI 414: Supplier Social Assessment 2016	414-1	11.12.3	115, 126		
		414-2	11.10.9	115, 126		
	GRI 3: Management of Material Topics	3-3	11.7.1	N/A	Not applicable to Thaioil Group as the Company does not engage in oil drilling activities.	
	GRI 402: Labor/Management Relations 2016	402-1	11.7.2	N/A		
Closure and Rehabilitation		402-2	11.7.3	N/A		
	GRI: Sector Standard: Oil and Gas 2021 (Additional Disclosures)	N/A	11.7.4, 11.7.5, 11.7.6	N/A		
Land and Resource Rights	GRI 3: Management of Material Topics	3-3	11.16.1	N/A	Not applicable to Thaioil Group as majority of areas in the Company's operations are state-owned lands (industrial development area).	
	GRI: Sector Standard: Oil and Gas 2021 (Additional Disclosures)	N/A	11.16.2	N/A		
	GRI 3: Management of Material Topics	3-3	11.17.1	N/A	Not applicable to Thaioil Group as majority of areas in the Company's operations are state-owned lands (industrial development area).	
Reporting on Land and Resource Rights	GRI 411: Rights of Indigenous Peoples 2016	411-1	11.17.2	N/A		
	GRI: Sector Standard: Oil and Gas 2021 (Additional Disclosures)	N/A	11.17.3, 11.17.4	N/A		
	GRI 3: Management of Material Topics	3-3	11.21.1	Website	Thaioil Group publicly discloses Tax strategy, Tax policy and tax payment on the Company website: https://www.thaioilgroup.com/home/content.aspx?id=583&lang=en	
Payments to Governments	GRI 201: Economic Performance 2016	201-1	11.21.2	Website		
		201-2	11.21.3	Website		
	GRI 207: Tax 2019	207-1	11.21.4	Website		
		207-2	11.21.5	Website		
		207-3	11.21.6	Website		
		207-4	11.21.7	Website		
	GRI: Sector Standard: Oil and Gas 2021 (Additional Disclosures)	N/A	11.21.8	Website		

Topic Specific Disclosure

Thaioil Sustainability Material Topics	GRI Topics	Disclosures	GRI SECTOR STANDARD 11	Page or Website	Comments/ Omissions	External Assurance
Public Policy	GRI 3: Management of Material Topics	3-3	11.22.1	website	Thaioil Group publicly discloses public policy in Corporate Governance and Code of Conduct Manual on the Company's website: https://www.thaioilgroup.com/home/content.aspx?id=29&lang=en	
	GRI 415: Public Policy 2016	415-1	11.22.2	120-121		

UNGCR PRINCIPLES COP

United Nations Global Compact Principles

Principles		Page
Human Rights	Principle 1 Businesses should support and respect the protection of internationally proclaimed human rights	70-75
	Principle 2 Businesses should make sure that they are not complicit in human rights abuses	70-75
Labour	Principle 3 Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining	70-75
	Principle 4 The elimination of all forms of forced and compulsory labour	70-75
Environment	Principle 5 The effective abolition of child labour	70-75
	Principle 6 The elimination of discrimination in respect of employment and occupation	70-75
Environment	Principle 7 Businesses should support a precautionary approach to environmental challenges	50-59
	Principle 8 Undertake initiatives to promote greater environmental responsibility	65-66
Anti-corruption	Principle 9 Encourage the development and diffusion of environmentally friendly technologies	65-66
	Principle 10 Businesses should work against corruption in all its forms, including extortion and bribery	33-37

TCFD Framework

	Recommendation	Recommended Disclosure	Page
Governance	Disclose the organization's governance of climate-related risks and opportunities.	a) Describe the board's oversight of climate-related risks and opportunities. b) Describe management's role in assessing and managing climate-related risks and opportunities.	30, 51 51, 31
Strategy	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term. b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning. c) Describe the resilience of the organization's strategy, taking into consideration different climate related scenarios, including a 2°C or lower scenario.	52-56 52-56 52-56
Risk Management	Disclose how the organization identifies, assesses, and manages climate-related risks	a) Describe the organization's processes for identifying and assessing climate-related risks b) Describe the organization's processes for managing climate-related risks c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	52-56 52-56 30, 51-52
Metrics & Targets	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process. b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions, and the related risks. c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	57 57, 59 50-51, 57, 33



SDGS PROGRESS

Thaioil assesses the significance of environmental, social, and governance impacts in our business activities through the materiality assessment. 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



Progress 2022

In 2022, Thaioil has reviewed 9 of the 17 goals in line with the SDG goals, of which 14 are targets. The progress details are shown in the table below.

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2022	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>Thaioil Group's Health and Learning Center for Community:</p> <ul style="list-style-type: none"> 32,114 beneficiaries accessed to the Thaioil Group's Health and Learning Center <p>Community Health Check-ups:</p> <ul style="list-style-type: none"> 192 community households received home visits for preliminary health check-up assessments. 267 community members received screening tests for chronic non-communicable diseases (diabetes and hypertension). 	Corporate Social Responsibility, pages 90-97
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, age, and promote the development of the quality of basic education.	<p>Sponsored an employment of 56 teaching assistants for each participating school, total 14 schools, in the leadership project for sustainable educational development through Restart Thailand program.</p> <p>Developed 2 change-maker teachers teaching science and English through Teach for Thailand program.</p>	Corporate Social Responsibility, pages 90-97
SDG 7: Affordable and Clean Energy 	<p>7.3 Double the global rate of improvement in energy efficiency.</p> <p>7a By 2036, 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.</p>	<p>To be ranked as the top quartile of Energy Intensity Index (EII) among the global oil and gas industry after CFP project operated.</p> <p>To support accessibility to clean energy for local communities and other remote communities.</p>	<p>Refinery Energy Intensity Index (EII) at 85.1 and ranked among leading companies in the oil and gas industry globally.</p> <p>Presented the solar power systems to Laem Chabang Hospital with a capacity to generate 89,000 kWh of electricity per year.</p>	<p>Circular Economy, pages 60-67</p> <p>Corporate Social Responsibility, pages 90-97</p>

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2022	More Information
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	Organized a job training course for 7 members in the Laem Chabang communities to promote community economy and encourage community members to have a main income and supplementary income. The activity was part of the community product project around Thaioil Group.	Corporate Social Responsibility, pages 90-97
	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 top 10% of the oil and gas industry.	TRIRR at 0.34 cases per million working hours for all workers, higher than the target of less than 0.30 cases per million working hours and continued to maintain performance in the top 10% among companies in the oil and gas industry.	Health and Safety, pages 76-82
		To achieve zero incident of process safety: Loss of Primary Containment (LOPC) tier-1.	One LOPC tier-1 event, equivalents to 0.05 cases per million working hours.	
		To implement the human rights due diligence process of Thaioil operations and to assess human rights risks for all critical suppliers.	Human rights risk assessment covered 100% of the business activities of Thaioil Group and of suppliers, and all risks have been assigned with adequate mitigation measures.	Human Rights, pages 70-75
SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. 	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	To promote an innovative culture and enhance business opportunities in the area of innovation.	According to the evaluation of the innovation level of Thaioil Group, the company's innovation level was at level 3 out of 5 levels.	Innovation & Customer Stewardship, pages 100-106

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2022	More Information
SDG 12: Responsible consumption and production 	12.2 Achieve the sustainable management and efficient use of natural resources.	To achieve a business target following the circular economy principles for cost reduction and efficient consumption of limited resources by operation.	41% of freshwater consumption was replaced by distilled water from desalination.	Circular Economy, pages 60-67
	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.	To achieve the target of maximization of efficiency natural resource consumption in order to minimize impacts to environment and social.	Ocean loss index of oil loss during marine transportation at 0.33% by volume.	Sustainable Supply Chain Management, pages 111-119
	12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse.	To achieve a business target following the circular economy principles for efficient consumption of limited resources and waste generation reduction.	4,426 tons of NO _x emissions. 6,542 tons of SO _x emissions. 1,275 tons of VOCs emissions. Zero significant oil and chemical spills according to target.	Environmental Management, pages 40-49
	12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities.	To promote sustainable green procurement in the organization and enhance environmental, social and governance (ESG) practices with suppliers.	Zero waste to landfill. 100% of new suppliers acknowledged Thaioil Group Supplier Code of Conduct (SCoC) and responded to the ESG self-assessment survey. Increased spending on environmentally products for the materials, equipment, and office supplies product group by 65% compared to the previous year, equivalent to 1,472 tons of carbon dioxide reductions.	Circular Economy, pages 60-67 Sustainable Supply Chain Management, pages 111-119

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2022	More Information
SDG 13: Climate Action 	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.	By 2060, Move towards a Net Zero Emissions Organization through using Decarbonisation Technology and Carbon Removal in order to capture the residual carbon, as well as seeking for the investment opportunities in businesses supporting the Net Zero Emissions goal.	GHG emission intensity at 0.0314 tons of carbon dioxide equivalent per barrels of crude oil equivalent, or 3.19% reduction from the previous year.	Climate Change Management, pages 50-59
	879,880 tons of carbon dioxide equivalents of avoided emissions from use of low carbon products.			
SDG 15: Life on Land 	15.2 Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	To promote Nature-based solutions through the restoration, conservation, and increasing areas of forest and mangrove to create a balanced ecosystem in the community which absorbs carbon from the atmosphere.	Collaborated to plant mangrove forests on an area of 56.22 rai in Chonburi province, which expected to reduce 1,520 tons of carbon dioxide equivalent throughout the 10-year project period.	Corporate Social Responsibility, pages 90-97
SDG 16: Peace, Justice, and Strong Institutions 	16.5 Substantially reduce corruption and bribery in all their forms.	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.	Zero case of non-compliance with laws and regulations or conduct that may lead to corruption and bribes by Thaioil Group's employees.	Corporate Governance and Sustainability, pages 27-37
100% of employees responded to the annual conflict of interest reporting.				

SURVEY OF READER'S OPINIONS



The result of this Survey of Reader's Opinions on the 2022 Integrated Report will be used to improve and develop the next annual Integrated Report.

Thank you for your kind cooperation.

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

1. Which group of readers would you describe yourself as?

- | | | | |
|---|--|-----------------------------------|---|
| <input type="checkbox"/> Shareholder/Investor | <input type="checkbox"/> Customer | <input type="checkbox"/> Employee | <input type="checkbox"/> Community surrounding Thaioil Group's operations |
| <input type="checkbox"/> Supplier | <input type="checkbox"/> Government agency | <input type="checkbox"/> Academia | <input type="checkbox"/> Student |
| <input type="checkbox"/> Media | <input type="checkbox"/> Others (Please specify) | | |

2. How did you receive or access to this Integrated Report?

- | | |
|---|---|
| <input type="checkbox"/> Shareholders' Annual General Meeting | <input type="checkbox"/> Seminar/Exhibition/Lecture |
| <input type="checkbox"/> Thaioil Group's employee | <input type="checkbox"/> Thaioil Group's Website |
| <input type="checkbox"/> Others (Please specify) | |

3. What is your purpose in reading this Integrated Report?

- | | |
|---|--|
| <input type="checkbox"/> To gain information about Thaioil Group | <input type="checkbox"/> To support an investment decision |
| <input type="checkbox"/> To prepare your own sustainability report and/or integrated report | <input type="checkbox"/> For research and/or educational purpose |
| <input type="checkbox"/> Others (Please specify) | |

4. Based on your interest and opinion, please rate Thaioil Group's sustainability performances

Economic and Governance Dimension

- | | | | |
|---|------------------------------------|---------------------------------|-------------------------------|
| Business Ethics and Code of Conduct | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Customer Relationship Management | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Digital Transformation | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Governance | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Business Diversification and New Business | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Systematic Risk Management | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Sustainable Supply Chain | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |

Environmental Dimension

- | | | | |
|---------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Environmental Management System | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Air Quality | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Biodiversity | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Circular Economy | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Climate and Net Zero Strategy | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |

Social Dimension

- | | | | |
|--|------------------------------------|---------------------------------|-------------------------------|
| Community Engagement and Social Value Creation | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Human Capital Development | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Human Rights | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Human Health and Safety | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| Talent Attraction and Retention | <input type="checkbox"/> Very good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |

5. Please rate completeness and reliability of this Integrated Report

- | | | | |
|---|-------------------------------|---------------------------------|-------------------------------|
| Your understanding of Thaioil Group's material topics | <input type="checkbox"/> High | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| The alignment between Thaioil Group's performances and strategies | <input type="checkbox"/> High | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| The appropriateness and reliability of the contents | <input type="checkbox"/> High | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |
| The matched contents with your interests | <input type="checkbox"/> High | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |

6. In your opinion, do the contents cover all material topics relevant to the Thaioil Group's sustainability?

- Yes No

If not, please specify the topic(s) that you think should be addressed.

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7. Please provide feedbacks or suggestions for improvement of the next annual Integrated Report.

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Please address this survey to
**Group Company Secretary and
Sustainability Department**
Thai Oil Public Company Limited

42/1 Moo 1, Sukhumvit Road Km.124, Tungsukla,
Sriracha, Chonburi 20230, Thailand
Tel : +66(0)-3840-8500, +66(0)-3835-9000
+66(0)3849-8900
E-mail : sustainability@thaioilgroup.com
Website : www.thaioilgroup.com



**Bangkok Office**

555/1 Energy Complex Building A, 11th Floor,
Vibhavadi Rangsit Road, Chatuchak, Chatuchak,
Bangkok 10900, Thailand
Tel : + 66(0)-2797-2999, +66(0)-2797-2900, +66(0)-2299-0000

Sriracha Office and Refinery

42/1 Moo 1, Sukhumvit Road Km. 124, Tungsukla,
Sriracha, Chonburi 20230, Thailand
Tel : +66(0)-3840-8500, +66(0)-3835-9000
Fax : +66(0)-3835-9019