



TOWARDS THE GREAT SUSTAINABLE FUTURE

THAI OIL PUBLIC
COMPANY LIMITED

INTEGRATED
REPORT 2023



TOWARDS THE GREAT SUSTAINABLE FUTURE

ABOUT THIS REPORT

THAI OIL PUBLIC COMPANY LIMITED



Thai Oil Public Company Limited has published this corporate sustainability report in line with the international reporting standards for the 13th consecutive year. The Company has committed to disclose all material information on corporate sustainable development transparently and accurately. This report encompasses the Company's economic, social, and environmental performances between January 1–December 31, 2023.

Reporting Approach

This 2023 Sustainability 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 integrates supplementary indicators specific to the Oil and Gas industry as per GRI 11: Oil and Gas Sector on page 076-079. The Report also outlines operational achievement progress in alignment with the ten Principles of the United Nations Global Compact (UNGC) on page 079, the Task Force on Climate-Related Financial Disclosures (TCFD) on page 079, and the United Nations Sustainable Development Goals (SDGs) on page 080-084. 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 074-075.

Scope of Reporting

The scope of reporting has been determined by consideration of 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 reported. The reporting coverage is 96% of Thaioil Group's sales revenue.



For more information, please contact:



The 2023 Sustainability Report is available for download at www.thaioilgroup.com



For additional information on Thaioil Group's performance beyond the scope of this Report, please refer to the 2023 Annual Report (Form 56-1 One Report) at www.thaioilgroup.com

**Sustainability Development Function,
Group Company Secretary and Sustainability Department**

Thai Oil Public Company Limited

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MESSAGE TO OUR STAKEHOLDERS

THAI OIL PUBLIC COMPANY LIMITED

Bandhit

Mr. Bandhit Thamprajamchit

Chief Executive Officer and President

Thai Oil Public Company Limited



For over 62 years, Thaioil Group has been dedicated to developing its capacities to become **the leading oil refinery company in the Asia-Pacific region.**

Thaioil Group maintains a steadfast commitment to sustainable growth towards a 100-year sustainable organization and plays a crucial role in driving Thailand's stable and sustainable economic growth.



Enhance Clean Environment



Engage Society



Ensure Good Governance

In 2023, Thaioil Group faced with several challenges arising from both domestic and global conditions. These challenges included prolonged economic stagnation resulting from fluctuations in financial markets and consumer goods prices, geopolitical conflicts in different regions worldwide, and demographic shifts towards an aging society, directly impacting overall business operations. Furthermore, there was a significant emphasis on achieving Thailand's goal of becoming a net zero greenhouse gas emissions nation by 2065, and the ongoing transition towards clean energy usage, known as the "Energy Transition," resulted in changes in consumer preferences and behaviors. In response to these challenges, Thaioil Group has adapted the business strategy to align with these factors to enhance our competitiveness and foster sustainable growth.

Thaioil Group has determined a long-term profit margin target for 2030 in accordance with global trends to reduce the impact of oil refining business fluctuations. In addition, the Company strives to achieve low-carbon and environmental-friendly business towards sustainable growth. The 2030 long-term profit margin target consists of 45% petroleum and high value product businesses, 30% petrochemical and high value products, 20% high value and other new S-curve businesses, and 5% power businesses. To achieve this ambitious target, Thaioil Group has developed a strategic plan under the concept of "TOP for the Great Future", built on the foundation of the 3Vs business strategic framework, as follows:

Value Maximization: Integrated Crude to Chemicals consists of strengthening business resilience and competitiveness by optimizing the benefits from the existing production base and extending the benefits across the value chain towards the petrochemical business and high value products.

Value Enhancement: Integrated Value Chain Management consists of being the market leader in sustainable energy, especially in chemical and high value products. The Company has focused on the high growth market in the region, such as Vietnam, Indonesia, and India, while seeking further investment opportunities.

Value Diversifications consists of building stability and sustainability in the investment portfolio through high value businesses, such as Disinfectants and Surfactants (D&S) businesses and new businesses related to global trends. In addition, the Company seeks investment opportunities in low-carbon businesses, such as biobusiness, new energy technology business, as well as businesses that can generate stable profit, such as power business.

To achieve the 3Vs business strategy and target, Thaioil Group has established business operational guidelines under the "TOP" concept, which consists of

T: Transformation transforming the organization in all dimensions to be ready for new business operations in the future

O: Operational to Business Excellence enhancing operations from "Operational Excellence" to "Business Excellence" in a sustainable manner

P: Partnership and Platform establishing a new working platform to achieve new businesses through partnership and platform

In addition to creating added value and business growth, Thaioil Group has defined a sustainability strategy that is aligned with the Company's business strategy in the Environment, Social, and

Governance (ESG) dimensions. This strategy is formulated to meet the expectations and maintain engagement of Thaioil Group's stakeholders through the 3Es sustainability strategic framework, as follows:

Enhance Clean Environment consists of the aspiration to reduce greenhouse gas emissions by 15% by 2035 from the base year in 2026 to achieve Carbon Neutrality by 2050 and Net Zero GHG Emissions by 2060.

Engage Society consists of the development of quality of life for society in line with the Thaioil Group's strategic directions by focusing on petrochemical business and innovations. The Company also places importance on strengthening relationship and developing quality of life for people in the communities surrounding the refinery area while enhancing social quality, such as education, occupation, public health system, and access to clean energy.

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 unwavering commitment to sustainable management, in 2023, the Company was recognized for sustainability assessment in the 2023 Sustainability Yearbook as the top 1% of the S&P Global ESG Score, the highest assessment level attainable, marking the eighth consecutive year of such achievement. Furthermore, Thaioil Group has been listed as a member of the Dow Jones Sustainability Indices (DJSI) 2023 for the 11th consecutive year by 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 environment, social, and business aspects on an international level recognition.

On behalf of Thaioil Group, I would like to express our gratitude to all stakeholders for their unwavering trust and support. Thaioil Group strives to achieve steady business growth while adhering to sustainable development based on Environment, Social, and Governance (ESG) principles. We remain committed to upholding our systematic environmental management and business responsibility for the community and society under good corporate governance. Furthermore, we foster innovations to meet the needs and expectations of stakeholders and be responsive to the evolving business landscapes in accordance with our vision of empowering human life through sustainable energy and chemicals.

TABLE OF CONTENTS

THAI OIL PUBLIC COMPANY LIMITED

01 Introduction

- 001 About This Report
- 002 Message to Our Stakeholders
- 004 Table of Contents
- 005 Financial Highlights
- 006 Sustainability Highlights

02 Group Overview

- 008 About Thaioil
- 010 Business Model

03 Navigating towards Sustainability

- 012 Stakeholders and Material Matters

- 021 Thaioil Group's Business Strategy Outlook

- 025 Sustainability Governance

04 Managing Thaioil Group's Material ESG Topics

- 028 Environmental Impact Management

- 038 Climate Change Management

- 049 Human Health & Safety

- 054 Innovation & Customer Stewardship

- 063 Performance Summary

05 Sustainability Appendix

- 074 Assurance Statement

- 076 GRI, UNGC Principles COP, and TCFD Framework Indices

- 080 SDGs Progress

- 085 Survey of Readers' Opinions

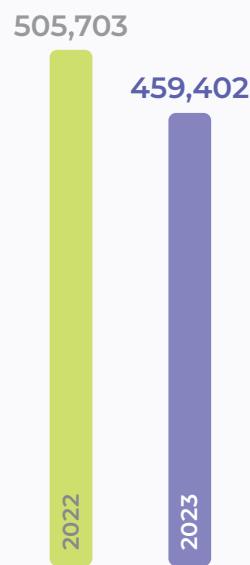
FINANCIAL HIGHLIGHTS

THAI OIL PUBLIC COMPANY LIMITED



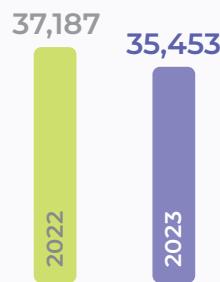
Sales Revenue

Million THB



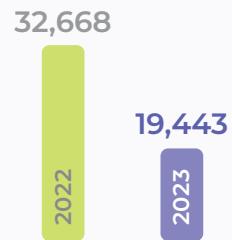
EBITDA

Million THB



Net Profit/ (Loss)

Million THB



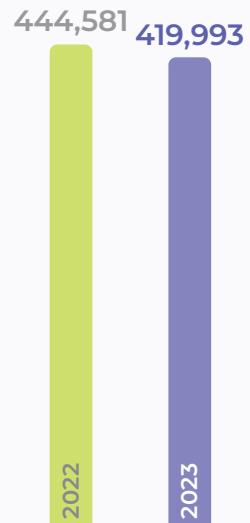
Net Profit/ (Loss) per Share

THB/ Share



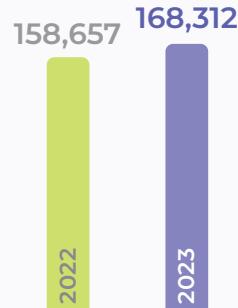
Total Assets

Million THB



Total Equity

Million THB



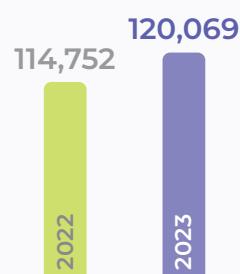
Dividend Payment

THB/ Share



Market Capitalization

Million THB



SUSTAINABILITY HIGHLIGHTS

THAI OIL PUBLIC COMPANY LIMITED



Environmental Dimension

Enhance environmental management to ensure effectiveness and alignment with global trends

Natural Capital

Total Greenhouse gas emissions reduced by **28,003** tons of carbon dioxide equivalent through energy efficiency improvement projects.

Zero industrial waste disposal to landfills.

Reduced dependence on external freshwater resource by replaced with desalination **37%**

No freshwater withdrawal for consumption from water-stressed areas.

Manufactured Capital

Accumulated carbon credits certified by Thailand Greenhouse Gas Management Organization (Public Organization) or TGO between 2019 - 2023 total

1,311,046

tons of carbon dioxide equivalent.

Intellectual Capital

6

New High Value Products.

Financial Capital

40

share of revenue from environmental-friendly products.

Intellectual Capital

218

new knowledge gained from knowledge sharing sessions among employees from Knowledge Management (KM) Project.

Empowering

2

community enterprises through the reforestation project by supporting knowledge of forest conservation, coupled with hiring the communities for planting and maintaining the forests. In addition, this initiative not only restores the environment but also stimulates local economy.

Natural Capital

218

new knowledge gained from knowledge sharing sessions among employees from Knowledge Management (KM) Project.

Manufactured Capital

1

process safety event (Tier-1).

Social Dimension

Empower social engagement to collaboratively uplift the quality of life, while being responsible to all stakeholders towards a sustainable future



Social and Relationship Capital

95%

community engagement score.

No

human rights complaints.

92%

employee engagement score.

94%

employee satisfaction score.



Governance and Economic Dimension

Ensure the robustness and maintain trustworthiness of good corporate governance as strong foundation for sustainable business growth

Financial Capital

No

cases or fines for non-compliance with laws and regulations, or cases of corruption and bribery.

Financial Capital

No

financial losses due to cyberattacks impacting business operations.

Benefits gained from knowledge and innovation for working process improvement

961 million THB.

Social and Relationship Capital

Zero

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

98% supplier satisfaction score.

94% customer engagement score.

ABOUT THAIOIL

THAI OIL PUBLIC COMPANY LIMITED



THAI OIL PUBLIC COMPANY LIMITED

Thai Oil Public Company Limited is a leading integrated petroleum refinery in the Asia Pacific region. The Company has been operating for over 61 years, and has a modern and highly efficient production process to produce and distribute refined petroleum to primarily support the domestic petroleum demands. Thaioil is guided by the principles of Operational Excellence, as an integrated group of businesses in oil refinery, petrochemicals, and lube base. This synergy enables Thaioil to optimize and plan production for maximum efficiency, enhance competitiveness, and achieve a top quartile among refineries in the Asia Pacific region, solidifying business stability in the process.

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

Headquarter:
Bangkok, Thailand

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

Registered Capital: **22,338,355,660** THB

Percentage of Shares Owned by PTT PLC.:
48%

Refinery Production in 2023:
Approximately **307,000** BBL per day
112% of nameplate capacity at 275,000 BBL per day

Domestic Distribution **29%**
of total domestic finished oil demand

Locations of Operations:
Thailand, Vietnam, Singapore, Hong Kong, and Indonesia

Number of Employees: **1,936** persons

STAKEHOLDERS AND MATERIAL MATTERS

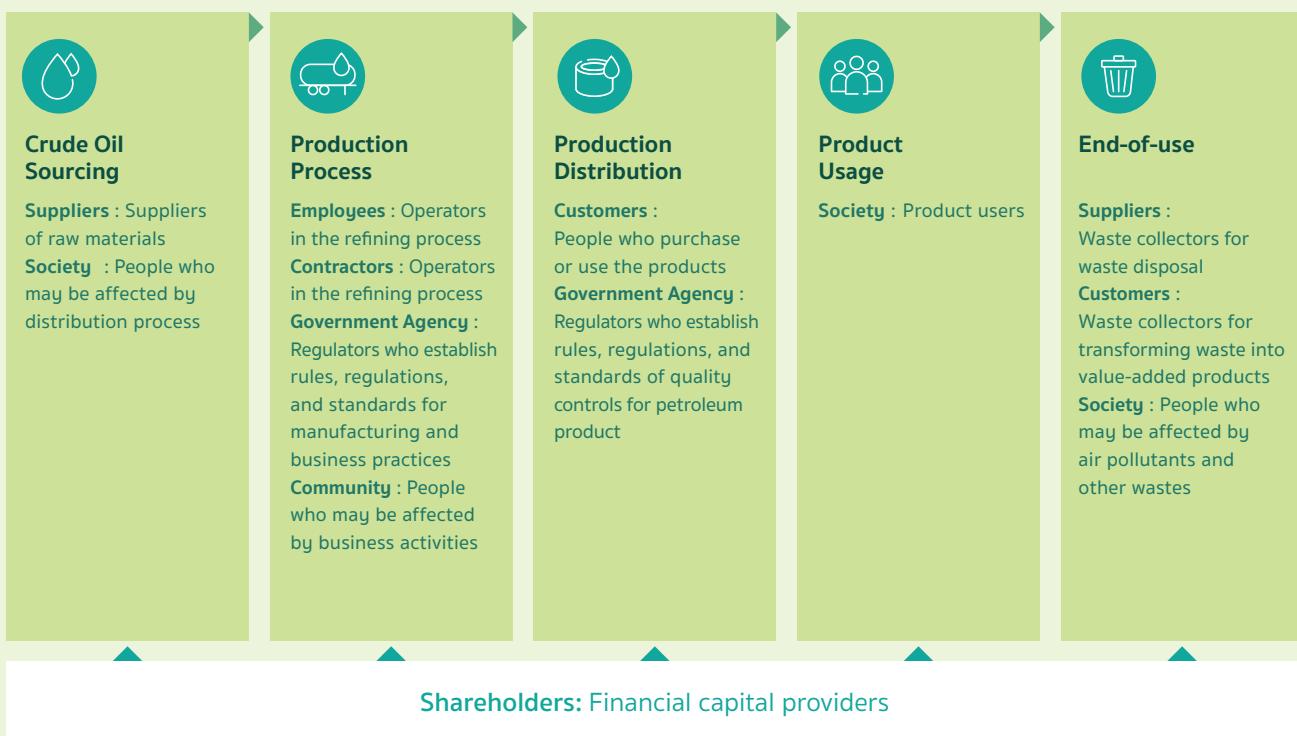
THAI OIL PUBLIC COMPANY LIMITED

Stakeholder Engagement

Maintaining a good relationship with stakeholders is crucial in creating long-term business value. Thaioil Group has established an internal function to maintain continuous communication with each stakeholder group. This aims to ensure stakeholders' perspectives and expectations regarding the Company's operations, ultimately enhancing the efficiency of Thaioil Group's performance.

In this regard, Thaioil Group has identified stakeholders by analyzing their involvement throughout the value chain, from crude oil procurement to the disposal of post-utilization products, through the Company's assessment of the mutual impact and influence, as depicted in the diagram below.

STAKEHOLDERS IDENTIFICATION ALONG THE VALUE CHAIN



From the above diagram, Thaioil Group has categorized stakeholders into six main groups and established stakeholder engagement approaches for each group of stakeholders. Since the COVID-19 pandemic, the engagement significantly altered the frequency and approach of communication and interaction towards a more predominant online format, as depicted in the table below.

Stakeholder Engagement Approaches

Stakeholders	Engagement Approaches
Shareholders/ Creditors/ Financial Institutions 	<ul style="list-style-type: none"> • Annual General Meeting (AGM) • Annual Report (Form 56-1 One Report) and Integrated Report • Quarterly meetings with analysts and rating agencies • Company Visits and Roadshows with analysts and investors, both domestically and internationally, approximately 20-30 times per quarter • 7 Opportunity Day and SET Digital Roadshow events per year • TOP IR application and Investor Relations webpage • Grievance mechanisms: 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 meetings with customers • Weekly, monthly, and quarterly E-newsletters • Occasional customer engagement • Grievance mechanisms: 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 meetings with suppliers and contractors during procurement process • Occasional email communication • Grievance mechanisms: Supplier Relations function, and Corporate Governance function email
Employees 	<ul style="list-style-type: none"> • Annual Labor Union meeting • Bimonthly meetings with Employee Committee • Annual online employee engagement survey • Annual online survey on the awareness, understanding, and perspectives of sustainability • Annual Report (Form 56-1 One Report) and Integrated Report • Quarterly “CEO Connect” Forum (Live) • Monthly meetings between the management and employee representatives • Monthly “Akane” Magazine • Weekly and monthly newsletters or E-newsletters • Welfare benefit and employee activity access applications, such as the “Jam Saab” application, etc. • Grievance mechanisms: Employee Relations function, and Corporate Governance function email



Stakeholders	Engagement Approaches
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 meetings with community leaders and tripartite meetings Monthly community visits and events Communication through social media and digital platforms, such as Line Official Account Thaioil Group Community Health & Learning Center Grievance mechanisms: Community Relations function, and Corporate Governance function email
Government and related public agencies 	<ul style="list-style-type: none"> Annual feedback survey Annual Report (Form 56-1 One Report) and Integrated Report Occasional meetings with government representatives and public agencies Monthly tripartite meetings between Thaioil Group, government agencies, and communities Grievance mechanisms: 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 the business in accordance with the Global Reporting Initiative (GRI) Standards by applying the Value Reporting Foundation's materiality matter assessment approach to identify material topics. The process has been verified by an independent third party.

THAIOIL GROUP'S MATERIALITY ASSESSMENT PROCESS



In 2023, Thaioil Group assessed materiality topics from the beginning of the year. The outcomes derived from this assessment became an integral part of consideration for the sustainability strategy during the Strategic Thinking Session (STS). This session aimed to support planning, target-setting, and resources allocation across six capitals, namely Financial Capital, Manufactured Capital, Natural Capital, Human Capital, Intellectual Capital, and Social and Relationship Capital.



01

Material Topics Identification (Identification)

Thaioil Group assessed the 2023 material topics through the analysis of internal and external drivers. The internal drivers' analysis involved a review of key issues derived from the short-term, medium-term, and long-term Business Strategic Direction. Additionally, the external drivers' analysis was conducted, focusing on the interests of stakeholders, highlighting issues from the assessment of Dow Jones Sustainability Indices (DJSI), material topics from leading companies in oil refining industry and other petrochemical industries, the United Nations Sustainable Development Goals (SDGs), and the national and global trends from recognized institutions, such as the World Economic Forum (WEF). These findings were prominently utilized in reviewing relevant material topics associated with Thaioil Group, building upon insights gained from the previous year.



02

Material Topics Prioritization (Prioritization)

Thaioil Group prioritized 2023 material topics by reviewing the results of the materiality assessment in the previous year through various external factors that could potentially impact the business and stakeholders. This prioritization was accomplished through a collaborative workshop with the executives together with the interview of stakeholders to assess their perspectives and expectations regarding sustainability issues. The materiality assessment also considered the impact on the Company's value creation across business directions, aligning with the Double Materiality Principle. The impacts on stakeholders, both quantitatively and qualitatively, were reflected in the Company's capacity to create value or financial repercussions, both positive and negative. The impact on the Company's value creation was also considered from different business perspectives. The material topics were grouped into high, medium, and low levels of importance through a ranking system. This process employed criteria based on two dimensions:

- 1) Impact and importance on Thaioil Group's ability to create value
- 2) Impact and importance on the stakeholders



03

Validation of Material Topics (Validation)

The Sustainable Development function was the first in line to review the comprehensiveness of material topics. The results were reported to the Sustainable Development Steering Committee, chaired by the CEO and President, for the final review and endorsement of the material topics, considering both internal and external impacts. In parallel, the material topics were also endorsed by the subcommittee, namely the Corporate Governance and Sustainability Committee.

Moreover, an external independent verifier was invited for participation to ensure the accuracy and completeness of the materiality assessment process, stakeholder engagement, and safety and environmental performance.



04

Strategic Integration for Organizational Risk Management and Strategy (Strategic Integration)

The materiality assessment, which was approved and signed, would be integrated into the Company's Enterprise Risk Management (ERM) process. This integration aimed to evaluate risks in business operations, formulate mitigation plans as needed, and support the consideration of strategic planning through the annual Strategic Thinking Session (STS) business planning process. This will serve as a pivotal foundation for sustainable organizational management by establishing policies, objectives, and strategies, both in the short, medium, and long term, as deemed appropriate.



Results of 2023 Materiality Assessment

The results of the 2023 materiality assessment revealed the contextual changes from the external drivers that potentially affected the stakeholder's expectations. There were positive and negative impacts on stakeholders and businesses in creating long-term value. In particular, there was heightened attention to climate change, urging the Company to transition towards a low-carbon society, evolving societal development

and engagement with the surrounding community, and fostering physical and mental well-being activities in the workplace. Moreover, climate change accelerated the intensified global legislations, regulations, and compliance, as well as shifted consumer behavior to emphasize environmental-friendly products. The results of the 2023 materiality assessment are illustrated and detailed in the following diagram.



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 Approaches	Importance to Capitals and Value Creation
				Environment	Social	Governance and Economic		
Energy Transition	<ul style="list-style-type: none"> Technological shift towards using alternative energy sources as a substitute for oil may have impacts on Thaioil Group's long-term revenue and business growth. 	<ul style="list-style-type: none"> Shareholders/ Creditors/ Financial Institutions expect Thaioil Group to adapt and expand its business in line with global trends, such as rapid shift in consumer behavior as well as the emergence of alternative energy sources poised to replace oil in the future, and to ensure sustainable business growth. 	 Business Diversification				Thaioil Group's Business Strategy Outlook (Page 021-024) 	 Innovation & Customer Stewardship (Page 054-062 or )
Occupational Health and Safety	<ul style="list-style-type: none"> The oil refinery business poses the high risks of accidents, injuries, and fatalities to employees, contractors, as well as the surrounding community and society. Such incidents can lead to production halts and negatively impact the Company's reputation. 	<ul style="list-style-type: none"> Customers expect Thaioil Group to elevate health and safety measures to create a safe working environment and foster sustainable coexistence. Suppliers/ Contractors expect Thaioil Group to promote health and safety, while enhancing worker well-being through initiatives, such as health promotion activities and prevention of work-related illnesses. Government and related public agencies expect Thaioil Group to consistently prioritize health and safety by implementing and efficiently managing safety systems to minimize risks and prevent potential accidents. 	 Human Health and Safety				Human Health & Safety (Page 049-053 or )   	
Climate Change	<ul style="list-style-type: none"> Intensified climate change policy, such as setting long-term targets for achieving Net Zero Emissions as per the Paris Agreement, may result in additional costs for businesses if not aligned with new laws and regulations. Opportunities for investment in new businesses that contribute to mitigating the impacts of climate change. 	<ul style="list-style-type: none"> Shareholders/ Creditors/ Financial Institutions expect Thaioil Group to conduct business with continuous reduction in greenhouse gas emissions to support global emissions reduction measures and mitigate the business risks of potential future carbon taxation. 	 Risk and Crisis Management				Thaioil Group's Business Strategy Outlook (Page 021-024)    	



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 Approaches	Importance to Capitals and Value Creation
				Environment	Social	Governance and Economic		
Climate Change	<ul style="list-style-type: none"> Physical health risks arising from climate change impacts on biodiversity. 	<ul style="list-style-type: none"> Government and related public agencies anticipate Thaioil Group to adopt climate strategies and net-zero greenhouse gas emissions targets to contribute to the emissions reduction goals. Community/ Society expect Thaioil Group to prioritize effective environmental management to avoid adverse impacts on ecosystem and prevent biodiversity loss, which can affect livelihood and lifestyle of the community. 	 Climate and Net Zero Strategy				Climate Change Management (Page 038-048 or )	 Environmental Management System
Eco-efficiency, Economics, and Circular Economy	<ul style="list-style-type: none"> Driving towards the circular economy initiatives of Thai government and other governments, such as increasing recycling efforts and implementing bans on single-use plastics. The societal trend and consumer inclination towards a circular economy create an expectation for businesses to reduce environmental impacts throughout a product's lifecycle, which may affect the Company's reputation, revenue, and long-term growth. Opportunities arise to adjust business strategies to align with the circular economy, reducing costs and maximizing the utilization of limited resources. 	<ul style="list-style-type: none"> Shareholders/ Creditors/ Financial Institutions expect Thaioil Group to engage in environmental initiatives following the circular economy framework to foster sustainable business operations and reduce environmental impacts. Government and related public agencies expect Thaioil Group to align its business with the circular economy framework in production processes to sustainably reduce negative environmental impacts internally and externally. 	 Biodiversity				 Community Engagement and Social Value Creation	 Air Quality Management
			 Circular Economy				 Environmental Impact Management (Page 028-037 or )	   

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 Approaches	Importance to Capitals and Value Creation
				Environment	Social	Governance and Economic		
Eco-efficiency, Economics, and Circular Economy	<ul style="list-style-type: none"> The expansion of Thaioil Group's business requires more resources such as raw materials, energy, and water, resulting in increased waste from production processes. These environmental concerns necessitate the Company's focus on sustainable resource management and environmental conservation. 	<ul style="list-style-type: none"> Suppliers/ Contractors expect Thaioil Group to conduct business with the circular economy framework to maximize resource utilization, minimize environmental and community impacts, and enhance long-term competitiveness. Employees expect the Thaioil Group to enhance air quality management as the organization's core operations directly involve air pollution, significantly impacting the environment and stakeholders such as employees and communities. 	 Sustainable Supply Chain Management				Sustainable Supply Chain Management ()	   
Demographic Changes	<ul style="list-style-type: none"> The global population is ageing, including in Thailand, where the proportion of elderly people is rapidly increasing, ranking among the highest globally. This trend may impact businesses, particularly if they are unable to accommodate retirement age needs, notably in the context of Thaioil Group's business expansion. Behaviors and work expectations of the younger generations (Millennials and Gen Z) significantly differ from traditional work culture. Failure of Thaioil Group to adapt in order to attract and retain this workforce can lead to a scarcity of human resources, especially in the context of business expansion. 	<ul style="list-style-type: none"> Employees expect Thaioil Group to enhance its human capital to support business expansion, retaining current employees, promoting career growth, and maximizing their potential equally. In addition, they expect Thaioil Group to establish a robust brand image to attract skilled external talents and drive stable and sustainable growth for the organization. 	 Community Engagement and Social Value Creation				Corporate Social Responsibility ()	   
Business Operations in Innovation and Digitalization	<ul style="list-style-type: none"> The risk of adapting to the digital transformation era in the oil refinery business, particularly in terms of preparing capabilities and workforce to enhance long-term competitiveness. 	<ul style="list-style-type: none"> Shareholders/ Creditors/ Financial Institutions expect Thaioil Group to leverage security-focused technology to prepare for cyberattacks or data breaches arising from increased digital usage. Suppliers expect Thaioil Group to elevate its digital system to meet international standards and adopt the digital system in operational processes to support future business activities. 	 Digital Transformation				Human and Organization Development ()	   

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 Approaches	Importance to Capitals and Value Creation
				Environment	Social	Governance and Economic		
Business Operations in Innovation and Digitalization	<ul style="list-style-type: none"> The increased threat and cybercrime risks may lead to the leakage of personal information, stakeholders' data breaches, or compromise of business secrets externally, affecting the Company's reputation. The opportunity to enhance operational efficiency through technological advancements and investments in new technologies to mitigate business risks and generate long-term revenue. 	<ul style="list-style-type: none"> Employees expect Thaioil Group to seek opportunities and invest in new businesses. The business operation should be more diversified and responsive to different situations by emphasizing innovation and human resources equally. This aims to maintain business competitiveness and foster sustainable business growth. Customers expect Thaioil Group to effectively manage risks, particularly in customer relationship management and supply chain management. It is crucial to prevent product shortages and to build sustainable relationship with customers. 	 Human Capital Development				 Human and Organization Development ()	
Good Corporate Governance	<ul style="list-style-type: none"> The increasing awareness of responsible investment among institutional investors, evidence by trends such as sustainable stocks, SET ESG Rating, and the development of the "Negative List Guide line" developed by national and international financial institutions, listed companies are increasingly prioritizing on human rights issues as this is a crucial factor for ensuring long-term business sustainable growth. 	<ul style="list-style-type: none"> Shareholders/ Creditors/ Financial Institutions expect Thaioil Group to uphold the principle of good corporate governance and transparency. Suppliers/ Contractors anticipate Thaioil Group to conduct business in an equal, fair, impartial, and accountable manner in all business transactions. The government and related public agencies expect Thaioil Group to conduct business in line with good corporate governance principle, ensuring transparency, preventing corruption, and upholding ethics throughout the organization. Employees expect Thaioil Group to prioritize on the human rights, which are fundamental for the Company's sustainable growth and sustainable business operations. 	 Governance				 Sustainability Governance (Page 025-027)	

THAIOIL GROUP'S BUSINESS STRATEGY OUTLOOK

THAI OIL PUBLIC COMPANY LIMITED



Approach to defining business strategy direction for the Thaioil Group

Ensuring effective and systematic strategic management remains a core operating principle within Thaioil Group throughout its corporate operations. This aims to foster confidence among stakeholders in driving business performance towards Thaioil Group's vision.

The Company has determined the strategic direction through the Strategic Thinking Session (STS) process. The changes in the business environment, current and future needs and expectations of stakeholders, and the readiness of Thaioil Group are considered through the brainstorming session with the top management of Thaioil Group. The outcomes of this session are presented and approved by the Board of Directors on an annual basis.

Business strategy direction of Thaioil Group

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 while delivering sustainable returns and enhancing the quality of life for all stakeholders, together driving the Company towards sustainable business growth. In addition, the Company will maintain the balance across economic, social, environmental, and governance dimensions.

In 2023, Thaioil Group continued to face several uncertainties from various external environmental situations. These included geopolitical conflict, concerns about economic recession, stringent environmental policies arising from escalating environmental issues, and the increasing trend towards electric vehicles and the adoption of alternative energy sources. Nonetheless, Thaioil Group recognized the importance of implementing a flexible and competitive strategic plan to seize opportunities for sustainable business growth. Therefore, the Company has formulated the business strategic direction and approach for business operation for both short and long term as follows:

Short-term Profit Maximization:

Thaioil Group enhanced its Operation Excellence to Business Excellence (O2Bx) by 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 included cost management.

Integrated Operational and Commercial Excellence:

Thaioil Group continued to operate its business with efficiency and flexibility throughout the value chain. The key initiatives included the strategic procurement of crude oil to ensure the most suitable types and quality, managing production volumes and processes to align with market demands, increasing the market share of high value products, and expanding customer base to high-growth regional markets. As a result, Thaioil Group achieved an initial profit increase from the business plan, totaling 6,943 million THB or 1.76 USD per barrel.

Furthermore, Thaioil Group maintained a utilization rate of 112%, which was higher than the average in the same industry. This high utilization rate consistently enabled the Company to capitalize on opportunities in production and sales to meet market demands.

Cost Management:

Thaioil Group implemented cost management initiatives through different measures, such as procurement management, effective maintenance planning, the use of co-insurance with the PTT Group, proactive risk management in foreign exchange, financial cost reduction through various financial tools, and tax planning, etc. This results in the Company being able to reduce operational expenses from the business plan by 1,810 million THB, or approximately 0.45 USD per barrel.

Long-term Strategic Execution:

Thaioil Group pursued business strategic directions and implemented strategies for sustainable long-term profitability and growth. This execution was an extension of Thaioil Group's value creation from a strong foundation through the Company's 3Vs business strategies.

The 3Vs Strategy



Value Maximization: Integrated Crude to Chemicals

The strategy aims to enhance product value by integrating the current business 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 5 main businesses with the details as follows:

- Refinery:** The refinery business is an important business foundation as reactant for petrochemical production. Thaioil Group has invested in the Clean Fuel Project (CFP) to enhance resilience and competitiveness in the long term. Moreover, the Company has supported the national energy security in the energy transition period by shifting 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 to the refinery business products through investment in the PT Chandra Asri Petrochemical (CAP), the largest petrochemical producer in Indonesia, as a joint venture with business partners. The purpose is to respond to petrochemical and other product demands in the Indonesian market, which has a high growth rate.
- Specialty Chemicals:** Specialty Chemicals business aims to expand the investment to the downstream petrochemical business. The purpose is to invest in the Solution Provider business model.
- High Value Products (HVPs):** The HVPs 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 integrate and manage the value chains of Thaioil Group to increase business competitiveness sustainably. Thaioil Group has developed and distributed the products to regional market while seeking the investment opportunities in the region aside from the core markets in Thailand, Laos, Cambodia, and Myanmar, with targeted countries such as Vietnam, Indonesia, and India.



Value Diversifications

The strategy aims to diversify portfolio investment to secure profits and to seek investment opportunities in new businesses (the New S-Curve) that correspond with future business trends, including:

- High Value Business (HVBs):** The Company aims to seek cooperation with business partners with a focus on the growth of Disinfectants and Surfactants (D&S), which has a high growth rate and aligns with the competitiveness of Thaioil Group.
- Technology and Green:** The Company aims to increase the resilience of Thaioil Group's portfolio investment in alignment with the industrial trends and energy transition. Two approaches were implemented: 1) Joint Ventures (JV) and Mergers and Acquisitions (M&A) in biobusiness and new energy business, and 2) Investment in Corporate Venture Capital (CVC) in sustainable technology business, hydrocarbon disruption technology, and manufacturing technology.
- Power:** The Company aims to support electricity security and secure Thaioil Group's profit by investing in Global Power Synergy Public Company Limited (GPSC), the flagship power plant in the PTT Group, and the power plant of TOPSPP under Thaioil Group.

3Vs Strategy's Action Plan by the timeline

Year: 2024 Short-term Action Plan

- Accelerating the construction of the CFP project to ensure its implementation aligns with the established plan and budget. The plan for commercial operations in some units is adjusted to maximize its benefits.
- Expanding the intermediate petrochemical industry into the downstream petrochemical industry of PT Chandra Asri Petrochemical (CAP) in Indonesia, where Thaioil Group has invested. At the same time, the Company explores the business and investment opportunities in high value product and specialty chemical development through the collaboration with business partners within PTT Group and other businesses.

Years: 2025-2027 Medium-term Action Plan

- Building competency in Thaioil Group for operating specialty chemical business, especially in the form of solution provider.
- Seeking opportunities for expanding the downstream businesses across the value chain to increase the values of the existing products, through the collaboration with business partners in refinery business, lube base oil business, aromatics business, olefins business, and Linear Alkylbenzene business (LAB). This includes increasing value-added products from the basic products to high value products.

Years: 2028-2030 Long-term Action Plan

- Strengthening the business 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 and its high value products at 45% and the petrochemical business and its high value products at 30% of the total net profits.



To ensure the efficiency and success of the strategies, Thaioil Group drives the operations through “TOP” principles, consisting of:

T

Transformation

Transforming and adapting the organization in both dimensions of business and supporting works to ensure that Thaioil Group is ready for new business operations in the future.

O

Operational to Business Excellence

Elevating operations through world-class standards and systems to achieve the best performance and business excellence.

P

Partnership and Platform

Building business growth through collaboration with business partners and key national and global business platforms.



SUSTAINABILITY GOVERNANCE

THAI OIL PUBLIC COMPANY LIMITED



Thaioil Group Sustainability Management Policy

Thaioil Group's Sustainability Management Policy demonstrates a commitment to operate business in accordance with Environment, Social, and Governance (ESG) practices, aligning with the global direction and the goals of the United Nations Sustainable Development Goals (UN SDGs). This policy aims to enhance the quality of life and create shared value with all stakeholders in the long term.



The details of Thaioil Group's Sustainability Management Policy are disclosed on the Company's website under the Sustainability/Sustainability Management/ Policy section 

Sustainable Development Governance Structure

Sustainable Development Structure

Thaioil Group manages material sustainability topics through dedicated function for each topic. The Sustainability Development function adopts a holistic approach to sustainability management and provides performance reports to the Sustainable Development Steering Committee (Executive Management Level) on a quarterly basis and the Corporate Governance and Sustainability Committee (Board Level) on a semi-annual basis. These results are subsequently presented to the Board of Directors for regular consideration and acknowledgment. In instances of significant and urgent risks impacting the Company's operations, these are promptly reported to the Risk Management Committee for immediate consideration and acknowledgment. Furthermore, the Risk Management function is responsible for reporting the organizational risk management results to the Audit Committee on a semi-annual basis. This aims to ensure that operations and practices align with corporate strategies, enabling the organization to effectively meet the needs and expectations of all stakeholder groups.



The details of Sustainable Management Structure are disclosed on the Company's website under Sustainability/ Sustainability Management/ Sustainability Management Structure section 

Board Role and Responsibility for Sustainable Development

Board of Directors

The Board of Directors is committed to sustainable business operations. Environment, Social, and Governance (ESG) dimensions are considered a fundamental basis for the business management through the formulation of policies, strategies, and objectives covering short-term, medium-term, and long-term, as part of the annual business planning process or Strategic Thinking Session (STS). During the session, the Board of Directors and the management level of all lines of work collectively conduct the environmental scanning, which may impact future business operations. The key sustainability initiatives of the Board of Directors in 2023 were as follows:

- Approved Thaioil Group's Net Zero Greenhouse Gas (GHG) Emissions Pathway and the interim target to reduce GHG emissions by 15% by 2035 from the base year of 2026.
- Approved the operational enhancement on safety, occupational health, environment, and biodiversity operations through the endorsement of Thaioil and Subsidiaries' Quality, Security, Safety, Occupational Health, Environment, and Energy Management Policy, as well as Thaioil and Subsidiaries' Biodiversity Statement.

The Corporate Governance and Sustainability Committee is responsible for overseeing the progress of sustainable management, encompassing GHG emissions management strategies, on a semi-annual basis.

Sustainable Development Steering Committee

The Sustainable Development Steering Committee consists of the Chief Executive Officer and President, and all Executive Vice Presidents. In 2023, the highlights of the initiatives were as follows:

- Reviewed and approved the sustainability material topics identified in 2023, along with corporate sustainability strategies.

- Reviewed and endorsed Thaioil Group's Net Zero GHG Emissions Pathway, including the interim target to reduce GHG emissions by 15% by 2035 from the base year of 2026. This is consistent with Thaioil Group's Carbon Neutrality target by 2050 and Net Zero GHG Emissions target by 2060.
- Steered and supported various internal functions to actively participate in integrating operations towards a sustainable organization across all ESG dimensions. This included approving key sustainable development plan to achieve Thaioil Group's sustainability targets.



The details of the committees that manage each sustainability topic are disclosed on the Company's website under Sustainability/ Sustainability Management/ Sustainability Management Structure/ Sustainability Committees and Working Groups section 

Sustainability Strategy

To achieve the vision of "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. The Group has actively managed Environment, Social, and Governance (ESG) dimensions to create long-term value for the stakeholders across the business value chain and respond to national policies and global trends.

In 2023, Thaioil Group reviewed the sustainability strategies to ensure alignment and advocacy to the business strategy to properly manage ESG risks. The details of the Company's sustainability strategic directions are as follows:

Sustainability Dimension	E: Environment	S: Social	G: Governance
Strategy	Enhance Clean Environment Enhancing environmental management in alignment with global trends	Engage Society Engaging with community and society to foster long-term social value creation	Ensure Good Governance Ensuring trust in corporate governance and transparency within the organization
Target	<p>Net Zero GHG Reduction: Reduce greenhouse gas emissions by 15% by 2035 from the base year of 2026 to achieve the Carbon Neutrality by 2050 and Net Zero GHG Emissions target by 2060 through the implementation of Net Zero GHG Emissions Strategy</p> <p>Creating Social Value: Enhance the quality of life within society in alignment with the Company's strategic direction towards petrochemical business, innovation, and support for achieving Net Zero GHG Emissions</p> <p>Strengthen Community Engagement: Maintain a community engagement score at 90% or above</p> <p>Nature-based Solution: Support the Net Zero GHG Emissions target through forest conservation, reforestation, and afforestation initiatives</p>	<p>Creating Social Value: Enhance the quality of life within society in alignment with the Company's strategic direction towards petrochemical business, innovation, and support for achieving Net Zero GHG Emissions</p> <p>Strengthen Community Engagement: Maintain a community engagement score at 90% or above</p> <p>Nature-based Solution: Support the Net Zero GHG Emissions target through forest conservation, reforestation, and afforestation initiatives</p>	<p>Zero Case of Non-Compliance and Fraud Incidents: No case of non-compliance with laws, regulations, and the Company's code of conduct</p> <p>Good Governance Recognition: A recognized organization for good corporate governance</p>



Sustainability Performance Indicators

Thaioil Group has determined the 2023 Sustainability Performance Indicators which are linked to the compensation of the Chief Executive Officer (CEO) and President, and the Sustainable Development Steering Committee. The sustainability performance is also integrated into the Corporate Key Performance Indicators cascaded to all levels of employees in relevant functions. This aims to ensure that the Company can achieve the targets of Environment, Social, and Governance (ESG) management. The components are shown as follows:

Part 1) Corporate Key Performance Indicators 70%

Thaioil Group indicates Key Performance Indicators based on the principle of the balanced scorecard to align with the direction of "Time to TOP UP". The Key Performance Indicators are classified into three areas:

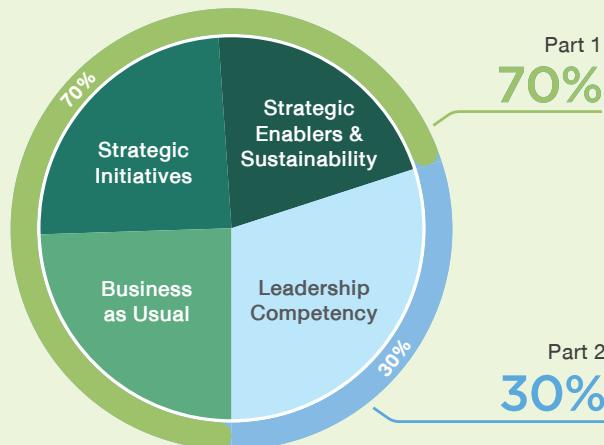
01 45% of performance in Business as Usual, such as:

- Net Operating Profit
- 7-Year Average Return on Invested Capital (ROIC)
- Total Recordable Case Frequency (TRCF) and Process Safety Event Tier-1 & Tier-2
- Operational Availability
- Energy Efficiency and GHG Intensity

02 30% of performance in Strategic Initiatives

03 25% of performance in Strategic Enablers & Sustainability, such as:

- Investment Grade Credit Rating
- Human Capital Index
- Learning Organization
- Stakeholder Engagement (Customer, Community, and Investor)
- Dow Jones Sustainability Indices (DJSI)



Part 2) Leadership Competency 30%

The assessment of the CEO and President's leadership competency is conducted in six areas, namely building shared vision, organizational management aligned with strategic plan, risk 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 the balanced scorecard and leadership competency (Please see more details of the result of performance assessment in the 2023 Annual Report (Form 56-1 One Report), Executives, page 147).

ENVIRONMENTAL IMPACT MANAGEMENT

THAI OIL PUBLIC COMPANY LIMITED

Challenges, Risks, and Impacts

Thaioil Group conducts a comprehensive review of the environmental risks and impacts on an annual basis. In 2023, the Company recognized several challenges arising from environmental factors, such as the intensive actions of climate change, including the establishment of Carbon Neutrality and Net Zero targets, air quality management, such as control of Volatile Organic Compounds (VOCs) emissions, compliance with environmental regulations, circular economy, preparation for drought situations, and biodiversity conservation. In addition to these challenges, Thaioil Group recognizes the impact of the business operations on local communities, which requires proper management to mitigate the risks. Consequently, Thaioil Group has elevated the management approach in construction projects and has implemented control over the production process to prevent adverse effects on the community's lifestyle and well-being. To achieve this, the Company has adopted the sustainability or Environment, Social, and Governance (ESG) management process to enhance work process and procedures that can reduce environmental impacts on communities and other stakeholders. This approach will be applied to all sizes of Thaioil Group's construction projects. Likewise, the Company maintains strict control over the current production process to ensure normal operating conditions. Moreover, Thaioil Group places significant emphasis on inspecting regulatory compliance and preparing for emergencies that may arise and impact the environment.

Commitments and Targets

Thaioil Group strives to enhance the Company's environmental management system in alignment with global trends, aiming to drive towards sustainable business growth while maintaining environmental awareness. According to the Environment, Social, and Governance (ESG) practices, the Company aims to reduce environmental impacts and create long-term business opportunities in collaboration with the community as specified in the policy. In addition, the Company has adopted an environmental management system in accordance with national and international standards to oversee and continually improve the management system and environmental master plan. In 2023, Thaioil Group elevated the policy commitment in "Thaioil and Subsidiaries' Quality, Security, Safety, Occupational Health, Environment, and Energy Management Policy" through the approval of the Board of Directors to consistently drive the most efficient environmental management practices.



Please see more details of Thaioil and Subsidiaries' Quality, Security, Safety, Occupational Health, Environment, and Energy Management Policy on the Company's website in Sustainability section/ WORLD: Environment well-being/ Environmental Quality Management 

Targets				
				
Complaints on environmental incidents	Non-compliance with relevant environmental laws and regulations	Major non-compliance with ISO 14001: 2015 standard	Significant oil and chemical spills into the environment	Compliance with excellent environmental governance standards in petroleum and petrochemical refineries
2023 Target 0 Case	2023 Target 0 Case	2023 Target 0 Case	2023 Target 0 Case of significant spill	2023 Target 100%
2030 Long-term Target 0 Case	2030 Long-term Target 100%			



Management Approach and Performance

Environmental Management

Management Approach

Thaioil Group takes responsibility in the three key areas, namely Environment, Social, and Governance (ESG) while the principle of the circular economy is 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 conscious and minimize the environmental impacts throughout the production chain.

- **Long-term Strategy:** Thaioil Group is committed to promoting business growth while maintaining environmental consciousness and creating long-term business opportunities. This commitment comprises two key strategies, namely the Net Zero GHG Emissions strategy and the Circular Economy strategy, both of which are supported by a well-defined governance structure.

- **Short-to Medium-term Strategy:** Thaioil Group is committed to minimizing environmental impacts at their sources and promoting ESG practices that are resilient to changes and aligned with global trends and the long-term business strategy. The Company has aligned the strategic management plan towards O2Bx (Operation Excellence to Business Excellence). In addition, the "Refinery in The City" model has been adopted in the management approach in pursuit of business excellence, focusing on three main areas on environmental management, social management, and governance compliance. To efficiently achieve these business excellences, Thaioil Group has implemented a management approach known as the "CARE Concept", which is outlined as follows:

C

Control Right

Controlling environmental impacts and maintaining compliance with the regulatory requirement. The environmental management has been elevated through Permit to Work-Job Safety Environmental Analysis (JSEA) to prevent and minimize potential impacts on communities that may be affected by the Company's production, construction, and transportation activities. The Company has also proactively prepared to mitigate impacts from the Clean Fuel Project (CFP), which is in the process of commissioning and start-up. This aims to maintain the trust of the surrounding community through active community engagement.

A

Awareness & Communication Right

Raising awareness, engaging in communication with stakeholders, and building trust in Thaioil Group's ability to prevent and mitigate the impacts of business operations. This is outlined in the Company's Sustainability Management Policy and Corporate Social Responsibility Policy. This aims to enhance the quality of life for communities and society, contributing to sustainable growth.

R

Recycling Right

Managing natural resources efficiency through the 3Rs strategy (Reduce, Reuse, Recycle) and the circular economy principle, in order to support the Sustainable Development Goals.

E

Eco-Society Right

Creating value to 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 employees to design initiatives for communities towards "Share Value with Society".

BECOMING THE PARTNER FOR LIFE THROUGH

“A Trusted Partner for Life”

A TRUSTED PARTNER FOR LIFE

Refinery in the city model



Thaioil Group operates business with transparency and fairness, prioritizing the appropriate return of benefits to all groups of stakeholders as well as emphasizing environmental protection and community well-being. To achieve this goal, the Company implements 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, executives, and employees who have expertise in environmental topics, as well as environmental regulations, laws, and global megatrends, etc. All factors are analyzed to identify business opportunities and enhance a five-year environmental plan referred to 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.

Thaioil Group enhances employees' knowledge on environmental management in alignment with the sustainability and environmental policies and practices. For instance, the Company organized training sessions on carbon taxes, Net Zero GHG Emissions, Carbon Footprint Organization and Carbon Footprint Products. In addition, statutory training was also conducted for environmental managers and practitioners in pollution treatment systems, which was attended by 34 attendants. The Company is committed to providing training on an annual basis to enhance employees' knowledge of environmental management for continuous efficiency.

Furthermore, Thaioil Group governs and develops environmental management systems according to accepted standards at the national and international levels. For example, 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 Dow Jones Sustainability Indices (DJSI) assessment. To improve and develop environmental management systems, these standards are adopted in risk assessments, environmental prevention and mitigation measures, operational controls, monitoring, inspection, and reporting processes, as well as the execution of the proactive and reactive environmental indicators. The Company has also improved and developed the environmental management system throughout the production process to end products across the value chain, covering operations in various conditions as follows:

Production in Normal Operating Conditions

Thaioil Group conducts risk assessments on environmental issues and implements preventive measures to mitigate environmental impacts at the sources on an annual basis or when significant changes occur. Moreover, the Company has been steadily enhancing production efficiency in accordance with the Environmental Master Plan which serves as the operational framework comprised the following topics:

- Governance Structure
- 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 remains continuously responsive to the requirements and expectations of relevant stakeholders.

Highlighted Projects

In 2023, Thaioil Group implemented additional projects as follows:

The Company has upgraded the control of Volatile Organic Compounds (VOCs) from the best practice developed with the industrial factory group, a member of the Petroleum Institute of Thailand and the Center of Excellence in Hazardous Substance Management, Chulalongkorn University. This upgrade enables the Company to control VOCs emissions in the maintenance process, storage tanks, and flare. In addition, the Company closely monitors air quality, especially VOCs emissions. In 2023, Thaioil Group developed the Scrubber Unit Machine to reduce the VOCs emissions, and subsequently, the machine has been efficiently utilized in the maintenance of oil storage tanks. Moreover, all relevant functions have monitored the efficiency of flare capacity and adjusted maintenance procedure to reduce VOCs emissions. This project will help the Company to prepare for the refinery turnaround in 2024 and 2025.



Scrubber Unit Machine, developed to reduce VOCs emissions during oil storage tank maintenance in 2023

Production in Abnormal Operating Conditions

Abnormal Operating Conditions



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



Meeting for the preparation of monitoring and recovery plan with government agencies

Environmental Emergency Conditions

In 2023, 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 experienced one case of significant oil and chemical spill, which was promptly managed. The Company has implemented management approaches in four aspects to efficiently manage the oil and chemical spill as follows:

01 Prevention

- 1.1 Using the ships that have 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, such as Sea Website and terminal feedback of the ships shared with the PTT Group. These documents are 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 regularly maintains oil pipelines at the port and offshore buoys, safety joints, and ship ropes. In 2023, Thaioil Group's Engineering Department conducted an annual inspection of the Single Buoy Mooring (SBM) in both the SBM-1 and SBM-2. In addition, the Company inspected the Conventional Buoy Mooring (CBM) and its chains. As a result, both the SBM and CBM system complied with the safety standards of the engineers.



- 1.3 Conducting tanker safety checks for both domestic and international tankers operated 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 temporarily suspended under circumstances that the defects do not align with specified safety standards.
- 1.4 Nominating employees in the port division to attend activities with IESG on a regular basis to exchange marine safety knowledge and ensure that operations align with international standards.



- 1.5 Organized an annual meeting between Oil Industry Environmental Safety Group Association (IESG) and the executives from Thai ship companies. As a member of IESG, Thaioil Group communicates information about ship

and port safety, such as updated port rules or defects identified by random ship inspection. This aims to ensure that the Company has properly implemented corrective actions to improve safety condition in business operations, and prevent accidents and pollutions from both ships and ports.



02 Mitigation

Despite having stringent preventive measures that align with international standards, Thaioil Group has also developed the mitigation measures to cope with unforeseen incidents, for example, the oil spill incident at SBM-2 in September 2023, as below:

- 2.1 The Loading Master, who serves as the head of oil transportation operations for the Company, is required to notify the Emergency Shut Down (ESD) and close all valves on the ship to suspend the flow and pressure oil transfer system. Otherwise, it may lead to increased oil leakage to the sea.
- 2.2 The service boat, that is stationed at the buoy, is required to close all valves of both floating and underwater buoy. This action prevents the flowing back of oil from the refinery's tanks into the sea. This action aligns with emergency procedures.
- 2.3 The Loading Master, who serves as the head of oil transportation operations for the Company, instructs the contractors to deploy oil absorbent booms along the oil pipeline to control the oil spills. This action aims to control oil spill within a limited area and prevent it from flowing to the sea, otherwise, it becomes difficult to control. The oil absorbent booms, prepared for use in the event of an emergency situation, are stored on the Company's contracted vessels.
- 2.4 The Company implements the oil spill prevention and response plan to prevent and eliminate water pollution. This aims to reduce and mitigate the environmental impacts until the situation is ultimately under control.





03 Prevention of Reoccurring Incidents

To build confidence for the government sector, the public, and all relevant stakeholders, Thaioil Group will investigate to determine the root causes of the oil spill. After obtaining permission from the government agency, the investigation will be conducted internally to explore the possibility of the incident and its causes. Simultaneously, the Company will develop a plan and take preventive measures to avoid the recurrences of such incident in the future.



Electrical test



Pressure test

- 4.2 Thaioil Group assigned employees who had not completed the training to join Oil Spill Response (OSR) IMO Level 1 for Responder, operated by Oil Spill Combat Team (OSCT-Thailand) between September 13-15, 2023.



- 4.3 Thaioil Group collaborated with IESG in Sriracha area to conduct a Shoreline Assessment at Koh Sichang beaches. This aims to understand conditions of the island, which are vulnerable to the environment and economy. The assessment is conducted every five years to update the database to the most current information.



04 Personnel Development

Thaioil Group prioritizes personnel development to ensure knowledge and capability in oil and petrochemical spill management. In 2023, the Company conducted activities to develop and enhance knowledge of the personnel on oil spill cleaning. The activities in 2023 are described as follows:

- 4.1 Thaioil Group conducted the exercise of marine oil spill response as a Table Top Exercise to the on-duty operators assigned in the Company's Emergency Plan. The exercise stimulated a scenario that the floating hose was broken at the SBM-2, resulting in an oil spill spreading to the Bang Lamung beach where it is the local fishery area and significant tourist destination that contributes to the local economy.



In 2024, Thaioil Group has developed the key plans as follows:

1. Participating with Oil Industry Environmental Safety Group Association in Sriracha area (IESG-SASC) to conduct the exercise on oil spill cleaning. This is a joint exercise with Thai Oil Public Company Limited, PTT Public Company Limited, and Esso (Thailand) Public Company Limited, which will be hosted by Thai Oil Public Company Limited.
2. Conducting the 2nd Shore Line Assessment with IESG-SASC after the previous 5-year assessment. The purpose is to determine the significant changes of shorelines. In addition, the result of this assessment will be used to examine and develop the pre-incident plan in the case that oil reaches the shorelines.
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. Providing training on incident management of the marine paraxylene spill for the employees in Sriracha Oil Terminal of PTT Oil and Retail Business Public Company Limited.
5. Developing personnel skills, expertise, and knowledge through nominating personnel for participating in trainings or conferences related to marine oil spill prevention and treatment.

Highlighted Projects

In 2023, Thaioil Group launched development projects and upgraded the management approach in the abnormal operating conditions and the environmental emergency situations as follows:



Experimental installation of the E-nose system in the Thaioil Group area

Thaioil Group collaborated with the innovation department of PTT Public Company Limited to conduct the study and experiment of the Electronic Nose (E-nose) system. The system assists in monitoring, detecting, and notifying the unpleasant odors that arise from the production process and other activities and may affect the employees, contractors, communities, and other stakeholders. The system is active 24 hours a day, allowing the Company to identify the sources of unpleasant odors and make improvements promptly.

★ 2023 Performances



Social and Relationship Capital



100%
compliance with
ISO 14001:2015



100%

compliance with relevant
environmental laws and regulations



0

complaint from
communities related
to environmental
impacts



100%
environmental performance
compliance with environmental
laws and regulations



100%

compliance with excellent environmental
governance standards in petroleum and
petrochemical refineries

Note: Scope limited to TOP, TLB, TPX, and LABIX in Sriracha District, Chon Buri Province



Natural Capital

There was

1 case

of oil and chemical spill into the environment. Thaioil Group promptly managed and contained the spill incident. The engineering and other relevant functions have also taken corrective and preventive actions to prevent future occurrences.

Note: An oil and chemical spill into the sea exceeding 1 barrel and a spill into the soil of 100 barrels are considered significant spills.

Air Quality Management

Management Approach

Thaioil Group is committed to minimizing environmental impact to facilitate continuous business, while maintaining environmental consciousness alongside surrounding communities. To achieve this, the Company has established targets for controlling air quality, including Nitrogen Oxides (NO_x), Sulphur Oxides (SO_x), Volatile Organic Compounds (VOCs), and Particulate Matter (PM). Starting from the design phase, the Company selects and installs high-efficiency technologies that meet international standards to control its production processes. The Company also monitors and measures air quality at its sources and in the surrounding areas on a regular basis in accordance with a predetermined schedule. The Company also uses an air quality monitoring system that displays real-time results and tracks the performance of air quality against international best practices. The Company's environmental management system and performance is audited and certified by an external party on an annual basis.

NO_x and SO_x Emissions Management

Thaioil Group assesses environmental impacts and determines preventive measures to control NO_x and SO_x emissions from the production process. 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 NOx in 2010 to effectively reduce Nitrogen Oxides 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), respectively. 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 Oxides emissions at levels that were better than the required standard while achieving the set target in 2023.

In 2023, Thaioil Group implemented additional projects to control SO_x and NO_x emissions as follows:

- Thaioil Group has conducted a feasibility study on Predictive Emission Monitoring System (PEMS) to replace the Continuous Emission Monitoring System (CEMS). This method is certified by USEPA and the information will be provided to the Department of Industrial Works for consideration as an alternative approach for monitoring air quality emitted from stacks, contributing to sustainable development in alignment with international standards.



VOCs Emissions Management

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

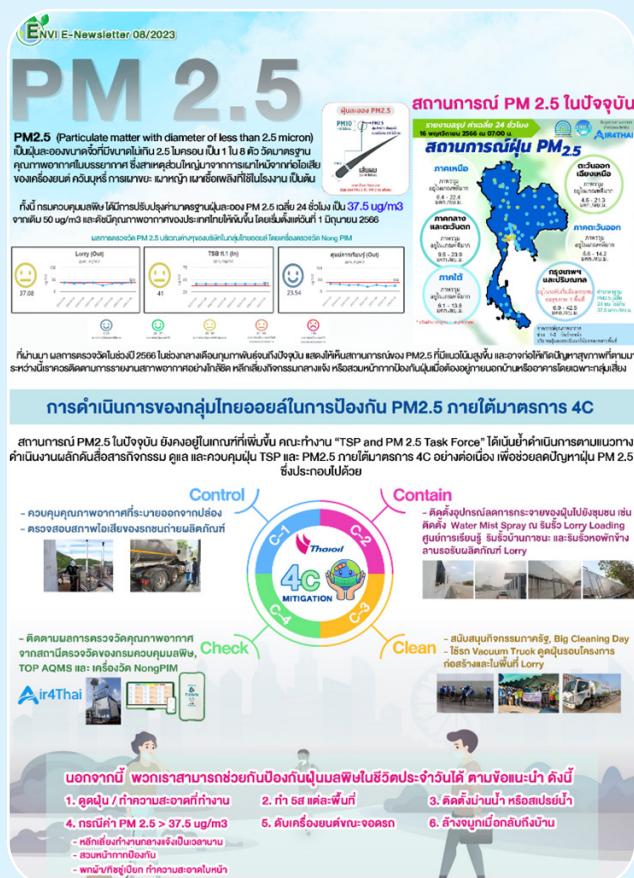
- **Flares and Fuel Combustion:** The Company monitors the efficiency of flare, maintenance process, and controls undesirable incidents that may emit VOCs emissions from the combustion tower.
- **Tanks and Loading processes:** The Company selects the most suitable tank for storing chemicals and oil. The Vapor Recovery Unit (VRU), installed with up to 99% efficiency, treats VOCs emissions from continuous product transfer.
- **Effluent Treatment Plants (ETP):** The Company regularly tracks and monitors VOCs emissions to improve its wastewater treatment system. The ETP Cover Project has been initiated and 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 emission 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) since 2012. This provides opportunities for further improvement to prevent fugitive emissions.
- **VOCs Reduction Measures in Maintenance:** The Company has amended the maintenance work procedures to align with best practices and ensure VOCs emissions control below legal requirements in all activities.

In 2023, Thaioil Group implemented additional projects to control Volatile Organic Compounds (VOCs) emissions as follows:

- Thaioil Group invented the “Scrubber Unit Machine” by adopting the Wet & Dry Scrubber Technologies. During the maintenance process, this machine assists in reducing the VOCs emissions to below 500 ppm before opening oil storage tanks. Currently, the machine has been successfully implemented in the maintenance process, yielding effective results.

Particulate Matter (PM) Management

“PM2.5 Taskforce” consistently monitors and determines the management approach to drive and communicate activities to control PM2.5 under the 4C measures (Control, Contain, Clean, and Check). These approaches have been implemented to reduce environmental impact at the sources, such as office buildings, production processes, construction projects, and community areas, as well as supporting governmental activities and measures. Besides, the Company regularly measures PM10 and PM2.5 by using the Air Quality Management System (AQMS) and undergoes audits by external parties. Likewise, the Company regularly communicates the PM2.5 management through ENVI E-newsletter to all employees.



Communication of PM2.5 Management through the ENVI E-newsletter

In 2023, Thaioil Group implemented additional projects under the 4C measures as follows:

- **C-1 Control:** The Company maintained the air quality at a better level than standards and legal requirements. Several activities were undertaken to limit the use of vehicle and road usage, including the promotion of carpool campaign, the change of carpool vehicles to electrical vehicle, and the adoption of “Fast & Flow” strategy to manage traffic flow. The Company also 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 walkways, aiming to reduce diffused and accumulated dust. The activities included 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 risk areas.
- **C-3 Clean:** The Company established cleaning initiatives in buildings, lorry loading areas, and construction sites. These initiatives included activities such as carpet cleaning, air conditioner cleaning, 5S activities, Big Cleaning Day, and the TOP Green Road. In addition, the Company supported government initiatives to control dust levels on Sukhumvit Road by spraying water.
- **C-4 Check:** According to the site audit measures, the Company tracked dust pollution levels from the Pollution Control Department station, including the TOP AQMS lorry station, and used a PM2.5 NONG PIM detector to assess air quality both indoors and outdoors.

★ 2023 Performances



Natural Capital



Nitrogen Oxides (NO_x) emissions

increased by

0.79%

compared to the previous year



Sulphur Oxides (SO_x) emissions

increased by

5.30%

compared to the previous year



Volatile Organic Compounds (VOC_s) emissions

decreased by

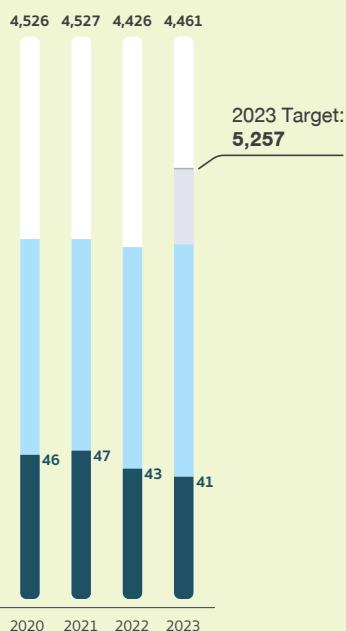
10.81%

compared to the previous year

The amount of Nitrogen Oxides (NO_x) emissions

■ Ton

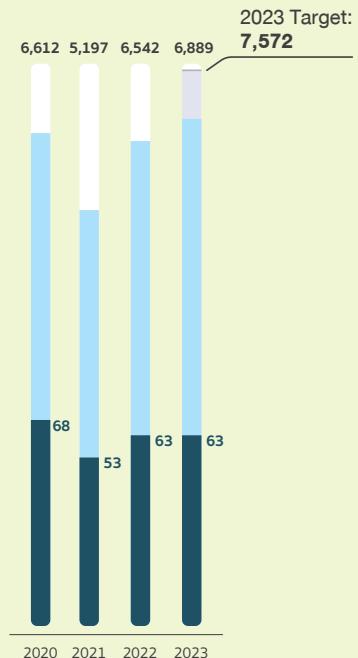
■ Ton per million barrels of crude oil equivalent



The amount of Sulphur Oxides (SO_x) emissions

■ Ton

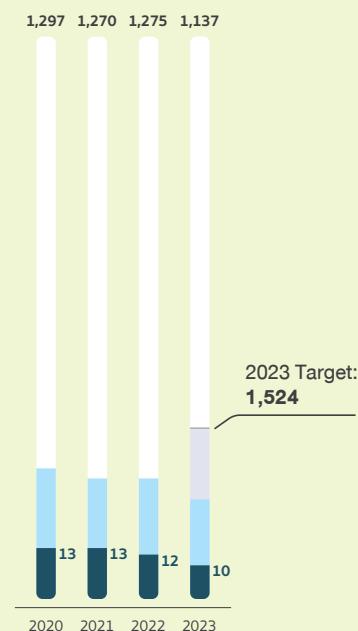
■ Ton per million barrels of crude oil equivalent



The amount of Volatile Organic Compounds (VOCs) emissions

■ Ton

■ Ton per million barrels of crude oil equivalent



CLIMATE CHANGE MANAGEMENT

THAI OIL PUBLIC COMPANY LIMITED

Challenges, Risks, and Impacts

Climate change is a critical global concern, evident in the United Nations Sustainable Development Goals (SDG 13: Climate Action) and regularly addressed at the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP). Thailand is committed to achieving the long-term goal of Net Zero GHG Emissions by 2065. This commitment is accelerating efforts for both public and private sectors to manage greenhouse gas emissions more effectively through the drafting of the National Climate Change Act, or Global Warming Act, which will take effect soon. Additionally, there is a strong emphasis on national clean energy production and utilization to respond to the forthcoming changes in consumption patterns and stakeholder expectations in the energy sector. Thaioil Group has recognized these challenges and considers them as risks and opportunities for the Company to determine the most effective targets and long-term strategies.

Commitments and Targets

The Board of Directors and executives of Thaioil and its subsidiaries have acknowledged the importance of steering future business towards a clean energy business and a low-carbon society. The Company positions our policy advocacy in alignment with the Paris Agreement and Thailand's Nationally Determined Contribution (NDC). The Company focuses on feasibility studies of new businesses, including high value environmental-friendly products and process optimization for maximum efficiency. Moreover, the Company has determined tangible strategies and established long-term targets in line with national commitments.

Targets



GHG emissions reduction
(Scopes 1 and 2)

Long-term Target

Reduce **15%**

of GHG emissions by 2035 compared with the base year in 2026



GHG emissions
(Scopes 1 and 2)

2023 Target

Less than

3,460,000

Tons of carbon dioxide
equivalent (tCO₂e)

Long-term Target

Carbon
Neutrality
by 2050

Net Zero
GHG Emissions
by 2060

Management Approach and Performance

Management Approach

Governance and Oversight

The Board of Directors conducts an annual review of corporate climate change strategies and adopts risk management process as a tool to assess climate change impact on future business operation. Climate risks are monitored on a quarterly basis. The Board also tracks climate-related key performance indicators including Energy Intensity Index and Greenhouse Gas Intensity, which are part of the Corporate Key Performance Indicators, to evaluate the performance of executives and employees.

In 2023 strategic review, the Board endorsed the Net Zero GHG Emissions Pathway 2026–2060 and considered budget and investment approach in low-carbon technology, such as studies of the installation of Carbon Capture technology in production unit, Blue and Green Hydrogen business, and Sustainable Aviation Fuel (SAF) production.



The Board of Directors has assigned the Corporate Governance and Sustainability Committee (Board level) to oversee and monitor the progress on a semi-annual basis. The Sustainable Development Steering Committee (Executive level), chaired by the Chief Executive Officer and President, is assigned to drive the implementation, and monitor the progress on a quarterly basis. The management of Thaioil Group is responsible for managing implementation 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, Finance Function, and Corporate Social Responsibility Function. These functions are responsible for assessing climate-related risks and opportunities, including aligning their work as per the organizational climate strategy, developing action plans and Thaioil Group’s Net Zero GHG Emissions Pathway and Roadmap, and regularly reporting performances as well as risk and opportunity management to the committees.

Thaioil Group's Net Zero Greenhouse Gas Emissions Governance Structure



Thaioil Group defines the Net Zero GHG Emissions Strategy, known as the 3Cs strategies, with the details as follows:



	Operational Approaches	2023 Progresses
C – Cut Down Existing Emissions Reducing GHG emissions in the current process of production (Scopes 1 and 2)	<ul style="list-style-type: none"> Emphasizing continuous energy efficiency improvement and controlling the ratio of low-emission fuel consumption in the production process to exceed that of high-emission fuel. This involves utilizing high-efficiency technologies and decommissioning obsolete production units to significantly increase the refinery's energy efficiency. Moreover, the use of fuel oil, which contributes to high GHG emissions in the production process, will be discontinued. This is due to the use of refined fuel oil in the production process which can produce high value products, therefore reducing emissions at the end consumption stage. Conducting a feasibility study on the use of Carbon Capture and Storage (CCS) technology in the production unit. Studying the adaptation of fuel use patterns in the production process to alternative fuels such as biomass or hydrogen, etc. 	<ul style="list-style-type: none"> Completed the Net Zero GHG Emissions Pathway 2026 - 2060. Implemented 23 energy efficiency improvement projects. Collaborated with PTT Group in studying the application of carbon capture, storage, and utilization as well as adapting hydrogen production.
C – Compensate Residual Emissions Offsetting the remaining greenhouse gases	<ul style="list-style-type: none"> Supporting the rehabilitation of the natural system or Nature-based Solutions through promoting the reforestation to capture carbon in the atmosphere. Creating carbon credits from investment projects that advocate carbon reduction. Conducting a feasibility study on a carbon credit trading approach. 	<ul style="list-style-type: none"> Allocated forest areas, including 8,300 rai of terrestrial forest and 356.22 rai of mangrove forest, in collaboration with the public sector to implement reforestation for carbon credit benefits. Created an accumulation of certified carbon credit of 1,310,492 tons of carbon dioxide equivalent (tCO₂e) from TOPSPP's Co-generation power plant in the Thailand Voluntary Emission Reduction Program (T-VER) since 2019. Created carbon credit 554 tons of carbon dioxide equivalent from 1 energy efficiency improvement projects. Enhanced knowledge and understanding of carbon market directions as well as Thai and international legal trends for employees.
C – Control Future Emissions Controlling GHG emissions in the future	<ul style="list-style-type: none"> Seeking investment opportunities in alternative energy, environmental-friendly, and low emission businesses, such as Sustainable Aviation Fuel (SAF), biobusiness, blue and green hydrogen business, and carbon utilization. Considering Carbon Pricing for driving investment in low-carbon technologies. 	<ul style="list-style-type: none"> In the process of the feasibility study of business growth diversification strategies to create profit stability and explore new value diversifications. In the process of the feasibility study of Carbon Utilization in collaboration with the PTT Group and monitoring government regulations.

Participation in trade associations to drive change

Thaioil Group collaborates with PTT Group, a leading energy company in Thailand, to study and brainstorm government laws and policies supporting Net Zero GHG Emissions under the PTT Group Net Zero Task Force (PTT G-NET). This working team consists of several sub-working groups to jointly study, advocate, and propose operational approaches to achieve the target. The approaches include Carbon Capture Utilization and Storage (CCUS), the use of hydrogen as an alternative energy source, increasing production potential by utilizing renewable energy to replace fossil fuels, and engaging in reforestation initiatives for the benefits of carbon credits.

Climate-related Risk and Opportunity Management

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

Transition Scenario Analysis

Thaioil Group assessed climate-related risks and opportunities by considering four factors, namely: regulatory; technological; market; and reputational. The two scenarios were assessed for the years 2030, 2040, and 2050 across the value chain, from upstream to downstream, as follows:

1. Stated Policies Scenario (STEPS): This scenario represents a pathway that considers the current policies and targets announced by governments in alignment with the Nationally Determined Contributions under the Paris Agreement.
2. Sustainable Development Scenario (SDS): This scenario represents a “well below 2 °C” pathway achieved through transitioning into a low-carbon economy and meeting all current net zero pledges of the International Energy Agency (IEA).

Regulatory Risk and Opportunity

Thailand's commitment to GHG emissions 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's production cost once new laws and regulations are enforced to drive the country towards net zero goals. For example, the Draft of National Climate Change

Act or Global Warming Act requires GHG emissions disclosure and actions toward national GHG emissions reduction targets. Meanwhile, economic mechanisms, such as carbon taxes, and emission trading schemes, may be applied in the near future.



Besides, carbon pricing can present a risk in upstream operations. Particularly, in the case that the origin country of crude oil suppliers mandates a carbon price. This could result in an increase in the Company's raw material costs. Likewise, in downstream operations, the risks of carbon pricing may arise with the execution of the EU's Carbon Border Adjustment Mechanism (CBAM), impacting the prices of some petrochemical products exported by the Company to the European market.

With these situations, the oil industry business might face challenges in adaptation. Also, the Company might encounter risks related to higher costs and a long-term shift towards clean energy. However, the government initiatives present opportunities for Thaioil Group to formulate its business strategy. For instance, if the government advocates or offers incentives for investing in clean energy ventures, such as hydrogen production or sustainable aviation fuel, it could facilitate Thaioil Group's adaptation to change its business landscape.

Mitigation Measures



Closely monitoring the progress of regulatory enforcement.



Conducting a sensitivity analysis for carbon pricing.



Joining 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 of the private sector.



Monitoring the impacts of carbon prices in case of transmission from crude oil suppliers and implementing appropriate sourcing strategies.

Technological Risk

Technology advancements in alternative energy that can replace oil may affect future business direction, posing risks to technological readiness, efficiency, and safety in use, as well as production costs. This is evident in the rapid technology development in utilizing alternative energy products, such as electric vehicles, hydrogen fuels, or carbon capture utilization and storage technology.

Mitigation Measures



Conducting a 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.



Exploring business opportunities in carbon utilization for commercial use.



Exploring business opportunities in blue or green hydrogen business.



Exploring business opportunities in New S-curve Business.

Market Risk and Opportunity

Factors influencing the consumption behavior of end-users of petroleum and petrochemical products (Downstream) include responses to the trends towards a low-carbon society and low-carbon energy. Moreover, the fluctuation of crude oil prices from crude oil suppliers (Upstream) could cause an uncertainty of business revenue. These factors are further accelerated by future market trends that are the result of the global energy transition as well as the growth of electric vehicle demand, resulting in a decrease in demand for fuel oil and other fossil fuels.

Moreover, the National Electric Vehicle Policy Committee (EV Board) has announced the 30@30 policy, aiming to produce at least 30% of Zero Emission Vehicle (ZEV) – vehicles emitting zero emissions – of the total vehicle production by 2030. In 2023, the EV board issued measures to support the use of electric vehicles in Phase 2 or EV 3.5 over a 4-year period (during 2024-2027). These measures are expected to accelerate the rapid change in consumer behavior towards ZEVs.

With the growing demand for clean and renewable energy, Thailoil Group has recognized the impacts on its product sales in both the short and long term. However, the energy transition also presents opportunities for the Company to explore new business investments and new products.

Mitigation Measures



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



Adjusting the business portfolio to support the future market.



Analysing peak oil demand and consistently tracking market trends to refine the product portfolio structure accordingly.



Investing in PT Chandra Asri Petrochemical Tbk (CAP), a leading petrochemical company in Indonesia, to adjust the product portfolio towards the high-demand chemical market.



Conducting feasibility studies of biofuel.



Joining feasibility studies of Sustainable Aviation Fuel (SAF) with PTT Group.



Continuously engaging with customers to understand their future product needs and adjusting business strategies to focus on high value products, specialty chemical products, and commodity products.

Reputational Risk and Opportunity

The factors that may affect Thaioil Group include insufficient actions to mitigate climate-related impacts in response to stakeholders' expectations such as societies, communities, shareholders, institutional investors, and employees, etc.

Mitigation Measures



Declaring a Net Zero GHG Emissions commitment.



Developing a Net Zero GHG Emissions Pathway.



Constantly communicating progress to stakeholders.



Joining groups and organizations that promote sustainable development and national commitments.

Result of Financial Impact Assessment

Key Risks

1. Impact of carbon pricing: This results from the emissions of carbon dioxide equivalent from the Company's production processes. The scenario analysis has been conducted under the assumption that Thailand adopts the GHG Emission Trading Scheme (ETS), and the control capacity is referred to the volume of GHG emissions by Thaioil Group for the year 2023. References to carbon prices for the years 2030 and 2050 in the Asian regions are based on the IEA World Energy Outlook 2021.
2. Impact of declining demands on the Company's products from the shift to use alternative energy (Downstream): These results are based on the demands for oil products in ASEAN, referencing the IEA World Energy Outlook 2021.
3. Impact of carbon pricing from the increasing crude oil price by crude oil suppliers (Upstream): These results are based on the assumption that the crude oil suppliers are affected by carbon taxes and pass on the costs to the Company's costs at 100%.

Please see more details of financial impact assessment on the Company's website, Sustainability section/ WORLD: Environment well-being/ Climate Change and Energy 



Physical Scenario

Thaioil Group assessed physical risks of both acute and chronic impacts from rising global temperature. The scenario analysis has been conducted for the years 2030, 2040, 2050 across supply chain, from upstream to downstream. Representative Concentration Pathways (RCPs), an internationally recognized climate model of the Intergovernmental Panel on Climate Change (IPCC), has been applied in two scenarios as follows:

1. The RCP 2.6 scenario represents a stringent greenhouse gas reduction measure.
2. The RCP 8.5 scenario represents a rapid increase in greenhouse gas emissions.

Water Scarcity Risk

The most significant physical risk for Thaioil Group is water scarcity in the production process and investments in expansion projects, such as the Clean Fuel Project (CFP) and other future projects. The water scarcity risk is classified as chronic impact because it is caused by the climate change that accelerates the water shortage and the economic expansion that increases water consumption demands, particularly in the Eastern Economic Corridor (EEC), located in the Eastern Region of Thailand. 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 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 has 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 reduce the potential risks in the production process and the community, as well as managing the risks in a timely manner.



Mitigation Measures

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 present, Thaioil Group uses two types of water. The seawater is processed to freshwater through the Thermal 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.

Other Physical Risks

To comprehensively cope with the impacts of physical risks, the Company has conducted the physical risks assessment in accordance with the Task Force on Climate-related Financial Disclosures (TCFD). The result of forecasted data in RCP 2.6 and RCP 8.5 revealed that the cyclone situation could be more intensified in the future. Even though the likelihood of cyclone is low, and the business has never experienced the risk of cyclone, it could potentially affect the business operation, if it occurs. According to the study and analysis of historical data, cyclones often occur offshore, which can pose acute impacts to the transportation of crude oil for using in the production process (Upstream) and marine transportation of products (Downstream). Regarding the legal requirement on the crude oil reserves, the Company has reserved sufficient crude oil for its production. Therefore,

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, the project under construction is 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, the Company has already signed a contract to purchase raw water from the private sector, and it is under construction for a raw water delivery system. It is expected to be completed and able to supply water to the Thaioil Group by 2024.

we are confident that the risk from cyclone will not affect the Company’s production process. Moreover, the wind speed at operational sites may pose hazards to workers, machinery, and equipment.

Mitigation Measures



Predicting and monitoring cyclone events and relevant warning system.



Planning the production and delivery of products in advance before offshore cyclones occur.



Reviewing and developing emergency measures to prevent cyclone-related risks.

Result of Financial Impact Assessment (EBITDA)

Key Risks

1. Impact of water shortage: In case the government sector reduces water supply to the Company by 10%, the Company must align its investments with the Long-term Water Supply Strategy. The Company is required to consider increasing the volume of freshwater from private sources and freshwater production from seawater by the Thermal Desalination Unit. Additionally, the Company needs to prepare the water reservation plan in appropriate areas to provide adequate water in the production process. However, these measures could increase production cost.
2. Impact of offshore cyclone events: The Company's revenue could decline from the cyclone event, particularly in the case that the Company is unable to deliver the products through marine freight during the offshore cyclone event. Also, pre- and post-cyclone events could disrupt the production process. In the pre-cyclone event, the Company must ensure worker safety and prevent damage to machinery and equipment. In the post-cyclone event, workplace inspections need to be conducted before operating the business as usual.



Please see more details of financial impact assessment on the Company's website, Sustainability section/ WORLD: Environment well-being/ Climate Change and Energy 

★ 2023 Performances

To achieve Thaioil Group's Net Zero GHG Emissions target, the Company has implemented projects to reduce the direct GHG emissions in the production process. The performance of Thaioil Group in 2023 is outlined as follows:

Reduction of Direct Greenhouse Gas Emissions (Scope 1)

Thaioil Group has implemented projects to reduce GHG emissions in production processes through the Energy Intensity Index (EII). The Company has invested in 23 energy efficiency improvement projects, resulting in GHG emissions reduction of over 28,003 tons of carbon dioxide equivalent (tCO₂e).



Thaioil Group has conducted a feasibility study to reduce GHG emissions at the source, namely the Assessment of the Carbon Footprint of Products for TOP Refinery in Business-to-Business (B2B). The project assesses GHG emissions from raw material procurement and production processes to shipping at the factory gate. The GHG data covering the years 2022 to 2023 was used as the base year for calculating the Carbon Footprint of Products, which was certified by the Thailand Greenhouse Gas Management Organization (Public Organization) or TGO. Thaioil Group plans to extend the scope of the Carbon Footprint of Products to its subsidiaries in the future.

Furthermore, Thaioil Group has implemented renewable energy projects to support carbon neutrality targets and

participated in GHG emissions reduction activities with government agencies. This aims to foster the GHG reduction of Thaioil Group and the national GHG emissions reduction targets. The completed activities are outlined as follows:



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 "Solar Rooftop at Thaioil's Buildings." The project has been completely applied in the Engineering Building Center, Thaioil Sriracha Building, and Laboratory. The purpose is to promote the use of renewable energy and the GHG emissions reduction. In 2023, the total production capacity of solar cells was 1 MWp, which was assessed and received a certified carbon credit for the first year with over 554 tCO₂e.



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" located in Sriracha District, Chonburi Province, operated by TOP SPP Company Limited. The project successfully passed the assessment and received certified carbon credits from 2019-2022. The total certified carbon credits were accumulated in total of 1,310,492 tCO₂e. The Company will conduct the next carbon credit certification from this project in 2024.

★ 2023 Performances



Low Emission Supporting Scheme (LESS),

project aims to enhance energy efficiency within Thaioil Group through energy conservation activities. The Company has selected three energy efficiency improvement projects under this scheme, including temperature reduction of Sulfur Recovery Unit-3 of Thai Oil Public Company

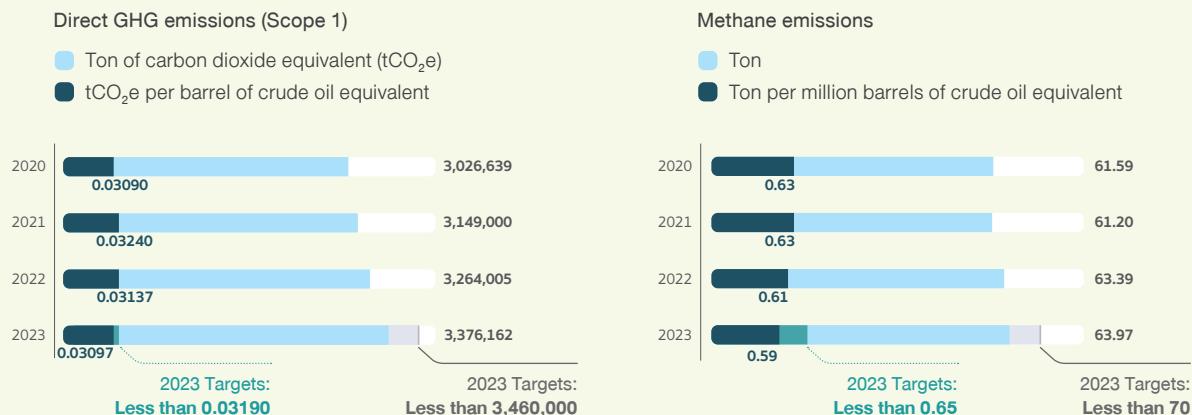
Limited, consideration for suspending Fuel Oil Circulation system of Thai Paraxylene Company Limited, and the efficiency improvement of the operation in the oil separation tower (C-58401) of LABIX Company Limited. These projects can reduce greenhouse gas emissions over 639.308 tCO₂e.

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

Through the implementation of energy efficiency improvement projects in the production process in 2023, Thaioil Group was able to successfully achieve targets for GHG emissions (Scopes 1 and 2). Furthermore, the Company has also established a long-term, medium-term, and annual target. Annual targets are determined from the energy consumption used per business plan in each year as follows:



Natural Capital



Natural Capital

Reduced direct GHG emissions by

28,003

tCO₂e from energy efficiency improvement projects.

Accumulated carbon credits (2019-2023) amounting to

1,311,046

tCO₂e.



Manufactured Capital

No

disruption in production processes caused by water scarcity.

100%

of operations were assessed for physical risk.



Reduction of Indirect Greenhouse Gas Emissions (Scope 2)

Thaioil Group has indirect greenhouse gas emissions (Scope 2) from the purchased electricity with the total of 8,244 tCO₂e, or 0.24% of greenhouse gas emissions (Scopes 1 and 2).

Reduction of Indirect Greenhouse Gas Emissions (Scope 3)

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 was adopted to control and reduce GHG emissions. In 2023, Thaioil Group successfully maintained zero waste to landfill performance against the set target.

- Conducted risks assessment and developed plans to minimize ocean loss during the transportation. The Energy and Loss Committee also designed a product loading system through pipeline to reduce GHG emissions from both land and sea within the production and transportation system.

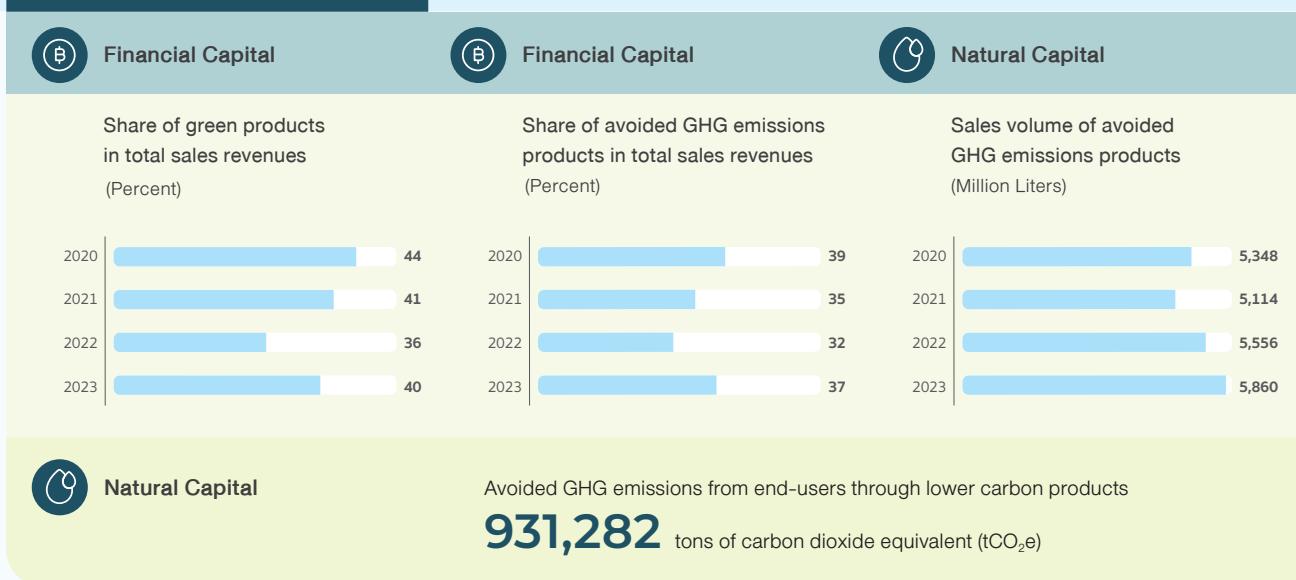
- Promoted the procurement of environmental-friendly products and services from partners. The Company organized "Thaioil CE WE GO (Thaioil Circular Economy) project" to increase waste value through upcycling initiatives, such as upcycling plastic waste into QSHE shirts for employees and contractors,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

In 2023, Thaioil Group had 5 green product categories, and 14 types of environmental-friendly products as follows:

Green Product Category	Product Sold by Thaioil Group	Company	Sales Value (Million THB)	Sales Volume
 Bio-based product	Ethanol from cassava		1,833.64	63.12 million liters
	Ethanol 99.5% (from cassava and corn)			
 Biodegradable Product	Linear Alkylbenzene (LAB)		7,984	148,951 tons
	Heavy Alkylbenzene (HAB)			
 Compostable Product	Cleaning products (KEEN)		0.39	2.20 tons

Green Product Category	Product Sold by Thaioil Group	Company	Sales Value (Million THB)	Sales Volume
 <p>Products that reduce emissions released to the environment (Emissions Reduction)</p>	Benzene-free solvents, including:		60.21	1.33 tons
	• TOPSol BF : Benzene Free		988.49	29,466.83 tons
	• Xylene (Isomer) : Low Ethylbenzene		6.08	112.38 tons
	• Methyl Cyclohexane (MCH)		33.89	513.28 tons
	Solvents with low concentration of polycyclic aromatic hydrocarbons (TOPSol A 150 ND: Low PAHs)		2,599.75	93,204.24 tons
	Rubber oils (TDAE, TRAE, AROS) with PCA content below the international limit – thus non-carcinogenic and does not cause genetic mutation in humans.		3,047.19	160.46 million liters
	Low Sulfur Fuel Oil (LSFO or Fuel Oil IMO) with sulfur content at 0.5% or below		10.47	154.75 tons
	Cyclopentane CP80 and CP97, which are agents that can replace use of CFCs and HCFCs		52,686.21	1,695.07 million liters
	Gasohol		116,222.44	4,164.74 million liters
	Biodiesel			

★ 2023 Performances



HUMAN HEALTH AND SAFETY

THAI OIL PUBLIC COMPANY LIMITED



Challenges, Risks, and Impacts

In 2023, the relief of the COVID-19 pandemic shifted the operations and lifestyle of employees and contractors to the “Now Normal”. However, the surveillance and preventive measure on the spread of the COVID-19 have been consistently maintained. In alignment with the business plan, Thaioil Group is now expanding the production capacity through several projects, such as the Clean Fuel Project (CFP), currently transitioning from the construction phase to the commissioning and start-up of refining units. These developments have presented challenges, prompting Thaioil Group to review and enhance safety control measures to ensure business continuity without any major incidents that could lead to business disruptions.

Commitments and Targets

Thaioil Group is committed to establish the foundation for management systems for both personal safety and process safety through the establishment of Thaioil Group Quality, Security, Safety, Occupational Health, Environment, and Energy Management Policy (QSHE) 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 employees and suppliers from operational risks by considering relevant rules, regulations, and standard requirements. The target goal is to position the Company as a “No Harm, No Leak, Goal Zero” company.

Maturity Level	Total Recordable Work-related Injury Rate (TRIR) for all workers (employees and contractors)	Process Safety Event (PSE) Tier-1
 2023 Target	Reach Maturity Level 4 Top 10% of companies in oil and gas industry (by IOGP criteria)	 0 incidents
 2030 Long-term Target	Maturity Level 4.5 0.10 cases per million hours worked	0 incidents

Management Approach and Performance

Worker's Health and Safety Management

Management Approach

Thaioil Group manages occupational health and safety through the establishment of Thaioil Group Quality, Security, Safety, Occupational Health, Environment, and Energy Management Policy (QSHE). The policy is used as a framework to drive and strengthen Thaioil Group towards continuous QSHE excellence and sustainability.

At present, Thaioil Group adheres to the **Operation 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	Standards of work
A	Awareness on hazards and risk assessments
F	Full compliance on work standards 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 containment

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, in 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.

Occupational Health and Safety Initiatives and Programs

In 2023, the key performance of Thaioil Group on occupational health and safety are as follows:

Operation Excellence to Business Excellence (O2Bx) Strategy

- Adjusted the O2Bx strategy to become a world-class refinery 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 environment, risks, the new strategic plans, and the new corporate targets.

Occupational Health and Safety Risk Assessment

- Reviewed the identification and assessment of risks and hazards assessment that may cause major incidents. The Company identified the control and preventive measures, with constant monitoring for effectiveness. This also involved safety inspections, performance analysis, and provision of the corrective and preventive actions to avoid recurrence for employees and contractors. The safety performance was reviewed monthly and monitored by the management.
- Assessed risks and hazards assessment with high severity and reviewed safety control and preventive measures. The proactive plans and measures on safety and security 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 process helps prevent and mitigate business impacts, ensuring that Thaioil Group can consistently manage and maintain severe risks at acceptable levels.

Safety Management Improvements

- Reviewed Permit to Work System, especially the work permits related to heat and ignition (Hot Work). Additionally, all relevant checklists were reviewed to ensure alignment with international best practices.
- Conducted safety maturity assessment. In 2022, the Company scored 4.16 out of a total of 5.00 points. Thaioil Group prepared the Safety Culture Development Plan in 2023 to build awareness for employees and contractors towards an accident-free organization.
- Conducted the evaluation of Health Performance Indicators based on the standards of International Association of Oil and Gas Producers (IOGP). In 2023, the Company scored 3.85 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.

Safety Knowledge Sharing and Engagement

- Enhanced the knowledge, capabilities, and skills of employees and contractors through a safety training center to provide knowledge on safety theory and practice. The Company also evaluated the capability of the employees and contractors, who performed safety-related tasks, and had a continuous Permit to Work System from the previous year. Meanwhile, the roles in emergency and crisis management were also assessed through the Competency Assurance System.
- Upgraded safety culture in the workplace through Behavior Based Safety (BBS) training program. The BBS training course was designed to train the targeted employees (Train for the Trainers) in order to disseminate knowledge and act

as role models for the other employees and contractors. Consequently, safety behavior will be observed, and the operation will be halted, particularly when unsafe conditions arise.

Thaioil Group consistently prioritizes on a proactive strategy. The Company elevated the Management Walk and Talk activity to GEMBA Walk. The management executives conducted a site visit to inspect key activities by engaging in conversations with specific questions. This aims to create mutual understandings and to recommend safety practices in the activities that may pose risks on personal and process safety. The QSHE Rollout activity has been consistently 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 encourage worker engagement. Moreover, Thaioil Group has applied appropriate management systems to achieve the sustainable development. The performance of such activities is regularly reported and discussed with the management 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 effective and impactful practices.

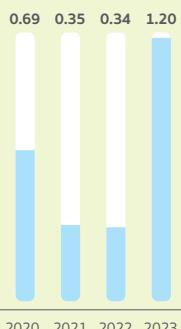


The details of Occupational Health and Safety Initiatives and Programs on the Company's website in Sustainability section / I: Our well-being/ Occupational health and safety [🌐](#)

★ 2023 Performances

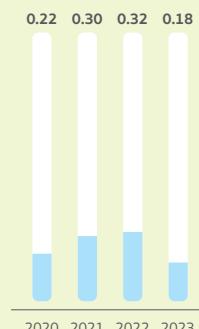
Total Recordable Injury Frequency Rate (TRIFR) of Employees

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



★ 2023 Performances

Work-related Fatalities



Employee
Zero case



Contractor
1 case,
equivalent to
0.05 cases per
million hours worked

Occupational Illness Frequency Rate (OIFR) of Employees



Zero case

According to the annual general medical
check-up and occupational health
risk exposure check-up report 2023

Remarks: From the analysis of health check-up report based on occupational
risk factors of the Company's employees in 2023 by the Company's occupational
health physician, it was found that there are no indicators nor tendency
suggesting that employees are becoming ill due to occupational illness.

Total Recordable Injury Frequency Rate (TRIFR) of Employees and Contractors



0.32 cases per million hours worked

Exceeded the target of less than 0.30 cases 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)

In 2023, while the Company was engaged in the Clean Fuel Project Constructions Phase, an accident occurred during the Post Weld Heat Treatment (PWHT) operation, resulting in severe injury to one of the contractors. The injured contractor received initial first aid at the accident site immediately by the Company's occupational health physician team and was promptly transported to the nearest hospital for further medical treatment. Unfortunately, the contractor passed away later at the hospital. The Company took this accident seriously, halted the construction project temporarily, and appointed a committee comprising specialized experts to determine the cause of the accident and implement preventive measures to avoid recurrence. Additionally, a systematic lesson learned sharing initiative was conducted for all relevant parties involved.

Process Safety Management System

Management Approach

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.

Process Safety Activities and Programs

In 2023, 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 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 and PTT Group management.
- Improved the Management of Change (MOC) in the production process to align with international best practices. This helps prevent incidents and reduce the impacts that may arise from changes or adjustments of production process. The Company reviewed other aspects such as risk analysis, preventive measures, and engineering design. Also, the technical reviews were conducted by specialists before the improvement. After the improvement, the mechanism would 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 in achieving the set targets.

- Developed and improved the Technical Authority (TA) System in accordance with international best practices to adopt in the MOC process. The purpose is to ensure that every change in the manufacturing process is systematically reviewed and approved by technical experts. Also, functions related to such changes can work safely and sustainably. In 2023, the Company conducted the Technical Authority training and knowledge & skills assessment of TA (TA2 and TA3) to improve the management of change systems.
- Reviewed and communicated the risks, controls and preventive measures for severe hazards that may occur in the production processes, such as product tank, incinerators, wastewater treatment unit, and Single Buoy Mooring (SBM 1 and 2) through Hazard Effect Management Process (HEMP). This aims to ensure the efficiency and effectiveness of the designed preventive measures or installed safety equipment that can always control risks at an acceptable level.



The details of Process Safety Activities and Programs on the Company's website in Sustainability section/ I: Our well-being/ Occupational health and safety [\(external link\)](#)



★ 2023 Performances

Process Safety Event:
Tier-1 in accordance
with API 754



In 2023, there was one case of inflammable or chemical substance leakage from primary containment or production process, resulting in severe impact (Tier-1) in accordance with API 754. This incident accounted for 0.04 event per million hours worked, falling short of the 2023 target of zero event per million hours worked. Thaioil Group has investigated the root causes of the incident to resolve them and prevent future occurrences. The investigation results indicated that the detection system and responsible authorities could detect the event at its origin and quickly bring it under control. Consequently, the production process was not interrupted.

INNOVATION & CUSTOMER STEWARDSHIP

THAI OIL PUBLIC COMPANY LIMITED

Challenges, Risks, and Impacts

2023 was a year full of challenges and risks, including global geopolitical conflicts in various regions of the world, volatile global financial markets, a slowing down of the Chinese economy, etc. Consequently, these challenges contributed to uncertainties and posed risks to business growth. In response, Companies had to adapt and strengthen their business strategies to become more resilient. For Thaioil Group, the Company adopted a two-pronged approach, including adjusting and diversifying the Company's investment portfolio to align with customer demands and enhance business diversification. In particular, the development of technology and the creation of "innovation", which are the Company's Corporate Value, will become crucial elements in steering the Company through uncontrollable external risks and ensuring long-term sustainable business growth.

Furthermore, Thaioil Group places significant emphasis on innovating new products to respond to existing and new customers through efficient coordination among various functions.

Targets

Thaioil Group is committed to become an innovation-driven company by elevating the Company's innovation maturity assessment from level 3 to level 4 (out of 5 levels) by 2026. This target refers to initiating research to establish outstanding innovative products and services that create significant business impacts for the Company. This is a challenging target as it requires collaboration from all organizational functions to create innovations that are beneficial to existing and future customers. Hence, the Company has determined the strategic plan for each year to achieve the targets in 2026 with the details as follows:

2022: The Company achieved an innovation maturity level at level 3 (out of 5 levels) and formulated a clear strategic development plan for innovation

2023: Emphasizing the development of corporate innovation culture and brainstorming activities to invent creative ideas that deliver organizational benefits

Commitments and Targets

In line with the innovation strategic development plan approved by the Board of Directors in 2022, Thaioil Group has determined to set a clear 2023 target for innovation, research and development, and high value product development. Employee awareness has been emphasized in order to place the importance of innovation through the promotion of an innovation culture. The Company has organized several brainstorming activities to stimulate creativity among employees and encourage them to innovate new working ideas to effectively respond to customers' evolving expectations and demands. In addition, the Company is committed to monitoring progress on a regular basis to ensure the achievement of overall objectives and deliver tangible benefits for the Company.

2024: Focusing on implementing creative ideas into practice to generate organizational benefits and reassess the Company's innovation maturity level to track its development progress to become an innovation-driven company

2025: Leveraging the results of the Company's innovation maturity level assessment to develop, improve, and enhance employee capabilities to elevate the Company towards a higher level of innovation-driven company

2026 Target



Level of Innovation

level **4** (out of 5 levels)

Furthermore, Thaioil Group prioritizes customer satisfaction with both the Company's products and services, starting from order reception and continuing throughout the management process to ensure that customers receive complete, accurate, and timely products. The Company proactively handles complaints and closely follows up to resolve the issue. Furthermore, the Company collaborates with customers to develop products to meet their specific needs. This enables the Company to adjust marketing strategies appropriately and grow alongside partners, building on our strong strategic partnership.

2023 Target



Maintain Thaioil Group's customer engagement score

92%



Management Approach and Performance

Innovation Management

Management Approach

In 2023, Thaioil Group defined Corporate Key Performance Indicators (Corporate KPI) on the innovation for the first time, which are categorized into five levels. Level 1 of the KPI focuses on employee awareness of the innovation culture, with a target of 75%. Levels 2 and 3 of the KPI focus on the number of new and practical ideas, with a target of 50 and 100 ideas, respectively. Levels 4 and 5 of the KPI focus on monetary benefits from the practical ideas, with a target of 50 and 100 million THB per year, respectively.

The Company's innovation targets were then cascaded across all 35 functions within the Company. Furthermore, brainstorming activities were organized for each function to collectively generate new ideas, with the most suitable ideas chosen for implementation for further organizational benefits.

Moreover, the Company consistently organized several activities to promote the corporate innovation culture (i-LEAD), arranged an award ceremony to honor employees who create outstanding innovations, and provided knowledge-sharing sessions on modern technology. These activities have all contributed to raise employees' awareness of the importance of innovation, in which all employees can actively participate.

Innovation Management

Innovative Culture

Approach to build internal corporate innovative culture

Thaioil Group has continuously encouraged the employees to create innovations collectively and fostered continuous learning opportunities in the field of innovation. In 2023, the Company organized activities to enhance employees' awareness on the importance of innovation as follows.

i-LEAD Project

Since 2022, Thaioil Group's business strategy has focused on creating new innovations as a cornerstone to foster sustainable business growth. Hence, the Company places importance on "innovation" by prioritizing and driving the Company's employees to develop creativity and invent new ideas and innovations to deliver value-added products and services in the future.

In 2023, the Company promoted the internal innovation culture through the "i-LEAD" behaviors. The behaviors are specified through a screening process by the employees' representatives at all levels, from top management to functional managers and employees. The project aims to design behavior characters that reflect innovative creativity in daily work practices through communication and awareness-building to ensure that employees will understand, remember, and apply these behaviors in their daily work. The activities in this project are described below:

Activities with Top Management

Building Innovation Culture Awareness through Top Management Workshop (Management Outing Workshop)



Organized a workshop activity for top management to be the leading change-makers. This aims to create Innovation Culture Awareness for employees in their line or function through the core behavior of "Lead to Innovation Culture." In addition, the workshop fosters them to exchange their experiences with external speakers on innovation creation, communication, and practices to apply the i-LEAD behavior as a role model.

CEO Townhall and Management Meeting



Organized a communication activity to encourage communication between the CEO and all employees to emphasize the Company's direction, strategy, plans, and performance. This activity helps to ensure that employees understand and are aware of the top management's commitment to bring changes to the Company and all employees. In addition, the progress of the Innovation Culture Awareness project will be regularly reported in the Company's top management meetings to stimulate them to foster an innovation culture among employees.

Activities with change agent in each function

Generating New Actionable Ideas through Change Agent SME Idea Facilitation & LO Inspirer Workshop



Organized a workshop activity to develop the change agent by choosing the representatives from selected functions. The groups of change agents will be developed with the full knowledge, skills, and tools, to facilitate them to create innovation culture and invent new ideas within their functions.

Building 360 Innovation Culture Awareness to Staff: Online & Offline

Organized a variety of activities, campaigns, and communications through the Company's communication channels, such as email, LINE Official Account, E-learning modules, and roadshow events, etc. In addition, the Company organized the Corporate Innovation and Learning Day to promote and reward employees for their innovative ideas that added value to the Company.





Enhancement of Innovation Knowledge for Employees

Thaioil Group encourages the employees to become quality innovators by raising awareness of the importance of innovation, providing knowledge enhancement for continuous development, and creating inspiration for innovation through the following activities:

TOP Innovation e-Newsletter



Organized a weekly E-newsletter, distributed to all Thaioil Group's employees, to promote creativity, out-of-the-box thinking, and a growth mindset. This aims to cultivate the qualifications of quality innovators and raise awareness of the importance of innovation in today's world. As a result, these activities have created good momentum and feedback for the Company. In 2023, the Company disseminated a total of 32 TOP Innovation E-newsletters with over 22,978 readers, which increased by 27% compared to the previous year. Meanwhile, the readers' satisfaction score was at an excellent level (97 out of 100).

The readers' satisfaction score was at an excellent level

Score
97

TOP BCG Updates



Organized a monthly E-newsletter to raise awareness of the BCG model, a new economic model of the Thai government focusing on the three economic systems in Thailand, including the Bio Economy, the Circular Economy, and the Green Economy. The examples of contents involve electric vehicles, hydrogen energy, and other climate innovations, which have attracted overwhelming employee interest. In 2023, the overall satisfaction score was at an excellent level (97 out of 100), and each E-newsletter issue attracted over 785 readers, indicating a consistently positive response.

The overall satisfaction score was at an excellent level

Score
97

Innovation Talk



Invited external speakers with expertise and knowledge in innovation, such as Mr. Jirayut Srupsrisopa (CEO of Bitkub) and Mr. Rawit Hanutsaha (CEO of Srichand), etc. In 2023, the Company organized four events. Employee participation increased by 35% compared to the previous year. Meanwhile, the satisfaction score increased from 91 to 93 out of 100.

The Employee satisfaction score

Score
93

2023 Thaioil Innovation Awards

Thaioil Group has gathered innovative projects from employees who participated in the Thaioil Innovation Awards in the previous year. The innovative projects were then categorized into three subcategories, including Idea for Innovation, Prototypes, and Innovations. There were 295 innovation projects submitted for the competition, approximately three times more than the previous competition. In 2023, the Company established a committee to award the winners, with 49 projects receiving Thaioil Innovation Awards. At the same time, the Company organized the Thaioil Innovation and Learning Day 2023 event on September 11, 2023, where the Thaioil Innovation Awards were presented to outstanding innovative projects, serving as encouragement and inspiration for all innovators.



Approach to Build External Corporate Innovative Culture

The collaboration between the research and development function of Thai Oil Public Company Limited and external agencies is considered as one of the key strategies to leverage the benefits of accessing advanced technologies that have been developed to the level that can be further implemented in the industry. This enables the Company to shorten lead time and complement each other's strengths, which increases opportunities for project success, leading to the practical implementation or the creation of new businesses. Additionally, it develops and enhances the knowledge and capabilities of researchers in areas of their research-related topics.

In 2023, Thaioil Group continued to emphasize the importance of collaboration in research and development with the educational sector. Thaioil Group signed two important Memorandums of Understanding (MOU) with Chulalongkorn University. These include the 6th consecutive MOU with the Petroleum and Petrochemical College (PPC) and the MOU to develop high value products with the Faculty of Pharmaceutical Sciences. These collaborations are the starting point for driving business transformation through research and development in a constructive manner.

Besides the collaboration with the educational and government sectors, Thaioil Group has expanded the partnership to develop new products with the research and development team of the private sector, including Kao Industrial (Thailand) Co., Ltd, under the co-development Emulsified Asphalts (EA) project. This product development integrates the strengths of Kao Industrial (Thailand) Co., Ltd, one of the biggest emulsifier producers in Thailand, and Thaioil Group, one of the biggest asphalt producers in Thailand.

Consequently, the high-quality EA products have been successfully developed and received the certification of chemical and mechanical qualifications by the Department of Highways, meeting the specifications and high quality.

In 2023, the Company completed two important research projects. The first project is the conversion of ethylene and carbon dioxide into ethylene carbonate for use as a solvent in lithium-ion batteries. The research result has enabled Thaioil Group to achieve the target of increasing the efficiency and safety of ethylene carbonate production processes compared to current technologies. With the result of this research, Thaioil Group has recognized the opportunities to register the patent for the production process, which is currently in the process of being drafted for registration with the Department of Intellectual Property. Moreover, this project collaborates with the Vidyasirimedhi Institute of Science and Technology (VISTEC). The second project is the improvement of diesel fuel catalyst testing unit, which attempts to increase diesel testing capacity from EURO 4 to EURO 5 standards. This improvement of the testing unit was designed and implemented by researchers at Thaioil Group. Additionally, this project is under collaboration with the Petroleum and Petrochemical College (PPC) of Chulalongkorn University.

Product Innovation

The development of new products, the enhancement of the value to existing products, or the development of high value products require the collaboration of research and development with internal and external partners. The activities involve brainstorming with the sales team to identify directions for new product development, brainstorming with the production team to improve manufacturing processes to

produce the product with the qualification that meets market demands, partnering with educational institutions to explore technology and business trends for the benefit of new product development, as well as collaboration with research and development of the private sector to jointly develop products that genuinely respond to market demands. Examples of Thaioil Group's product innovation are as follows:



Heat Transfer Oil



This product innovation aims to develop high value products derived from the current product of LABIX Company Limited. The project enhances the qualification of heat transfer oil through research on the essential qualifications and methods to enhance its qualifications in collaboration with laboratories. The product qualification test result revealed that the product qualification's stability exhibited at high temperatures of up to 300 degrees Celsius and demonstrated a longer lifespan compared to other heat transfer oils available in the market. In 2023, Thaioil Group sold this heat transfer oil to customers and received 0.6 million THB.

Phase Change Material



This product innovation aims to develop high value products derived from the current product of Thai Lube Base Public Company Limited through phase change material. This material can transition from one state to another with a slight temperature variation. This project involves researching methods to enhance the qualification of slack wax into phase change material. In 2023, the chemical, thermal, and physical qualifications of slack wax were tested and compared with the other commercial phase change materials. These findings are utilized to develop Paraffin Wax of Thai Lube Base as a phase change material for various applications, such as controlling or reducing the temperature of solar cells or batteries to enhance their efficiency, etc.

Process Innovation

Innovative processes can be classified into the development of production processes, operational processes, or product development processes. In 2023, Thaioil Group developed innovative processes in the field of product development by enhancing clarity and alignment with existing operational processes. This process has been certified by the Management System Certification Institute (MASCI) as it is aligned with current operational methods. The process emphasizes the cross-functional product development process of the functions related to high value product development. The team involves members from various related functions with the roles and responsibilities of each function clearly defined. Examples of relevant functions are the research and development, commercial, production, testing, and data research functions. Examples of Thaioil Group's process innovation are as follows:

Rubber Process Oil



This process innovation aims to develop high value products derived from the current product of Thai Lube Base Public Company Limited through innovative process. The project adjusted the Rubber Process Oil (RPO) to reduce the Polycyclic Aromatic Hydrocarbons (PAH) in rubber oil to the amount specified by the customer. The key steps of this process include (1) Selecting suitable raw materials for RPO production, (2) Adjusting conditions in the production process to control the number of carcinogenic substances, and (3) Blending processes to produce Light Residual Aromatic Extract (LRAE) with qualification specified by customers. In 2023, Thaioil Group launched this rubber process oil product to customers, resulting in a net 1.17 million THB.

Crude Compatibility Prediction Model



This process innovation aims to develop the testing process of sedimentation in different crude recipes. The probability of sedimentation from the crude oil mixing can be predicted with approximately 90% accuracy. 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 process will not only save energy consumption, but also bring opportunities in using various types of crude oil. The Company can also lessen the dependence on technical guidance from external parties.

In 2023, the research and development function transferred operational processes of the project to the product testing function to test additional crude oil defined in the new crude oil list. Also, the testing procedures at the operational level were additionally improved.

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 together with the technology owner company. The purpose of this project is to test and select crude oil recipes which are suitable for the refining process by considering different variants that are used in the RHCU process. The result of this project is used to plan the production process for maximum efficiency. The design of the RHCU Pilot Plant's operational process must align with the refining process and chemical reactions in the RHCU Pilot Plant. This 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 450 million THB per year. Moreover, it can prevent sedimentation risk of the product deviated from the refining process, which can cost approximately 2,000 million THB per incident. The construction and testing of the RHCU Pilot Plant are expected to be completed in the first quarter of 2024.

★ 2023 Performances

Based on the Corporate's Key Performance Indicators (Corporate KPIs) for innovation culture in 2023, Thaioil Group achieved the target at level 5, which is the highest level. The survey results revealed that 93% of employees have awareness of the corporate innovation culture. Moreover, the Company organized 43 sessions of brainstorming activities, and generated over 2,170 new ideas. The practical ideas that were implemented have the potential to generate total financial benefits of over 961 million THB per year.



Financial Capital

Investments in research and development
17 million THB



Intellectual Capital

High Value Products
6 products as follows:

High Purity Toluene: High purity Toluene used in the pharmaceutical industry	150LFO: Environmental-friendly latex in tire manufacturing process
Hexane TPC: Hexane solution	TOPSol LSP: Hydrocarbon solution LSP
TOPSol C9ALS: Hydrocarbon solution C9	TOPSol WO1: Hydrocarbon solution WO1

Customer Stewardship and Product Quality Management

Management Approach

Thaioil Group places great importance on customer stewardship, guided by the principle of "We care, We give, We leave no one behind (Sai Jai Prom Hai Mai Ting Kun)". This principle applies to all aspects, including product reception, service, and various project implementations with customers to achieve mutual growth. Additionally, the Company emphasizes the quality and safety of products and services in accordance with laws, regulations, and international standards to prevent negative impacts on customers and society. This commitment aligns with sustainable organizational development criteria, focusing on three dimensions, namely Environment, Social, and Governance (ESG). Furthermore, the Company actively listens to customer feedback and takes prompt and efficient actions for improvements to meet evolving customer demands.

In 2023, Thaioil Group continued to implement the Partner for Life plan to support customer stewardship in three aspects as follows:

- 1. Partner for Growth** focuses on addressing customer pain points by promptly developing new products and services in alignment with customer expectations regarding product quality, service, and business engagement. In addition, there is a Voice of Customer (VOC) system that gathers feedback and suggestions from customers, which helps ensure the new product and service portfolios to support the expansion of production capacity of the Clean Fuel Project (CFP) in the future.
- 2. Partner for Knowledge** provides academic knowledge and supports knowledge sharing in various forms, encompassing technical and operational aspects, as well as commercial aspects. This covers updated information concerning market situations related to petroleum, petrochemicals, base lubricants, and other relevant products. Additionally, Thaioil Group offers a comprehensive E-product catalogue that enables customers to access a wider array of Thaioil Group products.

- 3. Partner for Service** emphasizes continuous enhancement of the Customer Relations Management (CRM) practices, segmented into four aspects, as follows:

- 1) Operations aspect: Enhancing service efficiency and fostering continuous good customer relationships by standardizing product and service delivery throughout the Company, involving collaboration with all relevant functions such as commercial, quality, operations, logistics, accounting, support, digital, and customer relations management. This includes managing orders, ensuring accurate and timely product deliveries, handling complaints, and closely monitoring issue resolutions under the Service Level Agreement (SLA). Each function complies with standardized service level agreements, achieving a 100% compliance rate.
- 2) Analytic aspect: Continuing to enhance service efficiency and customer relations by proactively listening to opinions or suggestions from customers through the Voice of Customer (VOC) system and customer satisfaction and engagement surveys. This information is utilized to enhance and develop continuous service delivery and foster ongoing good customer relations.
- 3) Collaboration aspect: Providing knowledge sharing about the Company's high value products, such as a new "Heat Transfer Oil (HTO)" product, concerning details about its characteristics and types of the product as well as the applications across various related industries that align with the Company's potential customers. Notably, the Company already has transactions with this customer group. Furthermore, the Company has opened a pipeline transportation service to the Khon Kaen Oil Depot, a new oil depot in the Northeastern region. The pipeline connects the Saraburi Oil Depot to the Khon Kaen Oil Depot, reducing carbon dioxide emissions from the transportation process, thereby supporting the goal of achieving Net Zero GHG Emissions and promoting sustainable business growth in tandem with environmental preservation and social care.
- 4) Customer Data Platform aspect: Leveraging an international standard platform for storing fundamental customer data, intending for utilization in fostering and strengthening relationships with customers.



Highlighted Projects

In 2023, Thaioil Group conducted the “We care, We give, We leave no one behind (Sai Jai Prom Hai Mai Ting Kun)” project to maintain good relationships with customers, including:



Organizing activities to promote culture and volunteerism through the “You initiate, we fulfill” project, in the form of social engagement activities, TEAM SPIRIT, with customers (CRM and CSR Integration Activity).



Organizing 2023 “Happy Hours” activities for drivers to ensure safety during product pickups for the customer groups working at fuel stations, transport coordinators, ticket room staff, and other related units.



Organizing activities for providing knowledge to customers both online and on-site with various topics such as Fundamental of the Refinery Process and Business Overview and Refinery Overview. This aims to enhance customers' knowledge and understanding of the oil refinery industry.

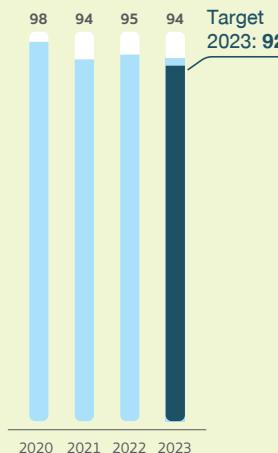
★ 2023 Performances

Through Thaioil Group's comprehensive operations encompassing both product manufacturing and service delivery, the Company has achieved a higher level of customer engagement that surpasses the predetermined targets.

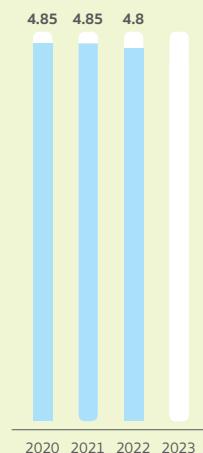


Social and Relationship Capital

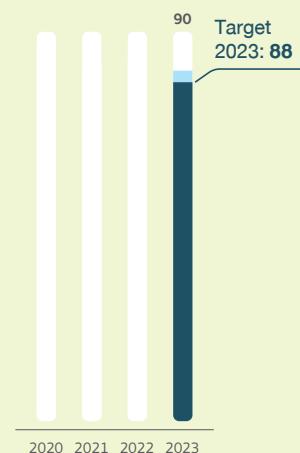
Customer Engagement
- Thaioil Group⁽¹⁾
Percentage (out of 100%)



Customer Satisfaction
- TOP Solvent Company Limited
(Currently, the Company's name has been changed to TOPNEXT International Company Limited)⁽²⁾
Score (out of 5.0)



Customer Engagement
- TOPNEXT International Company Limited⁽³⁾
Percentage (out of 100%)



Remark:

⁽¹⁾ 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). This survey was conducted by a third-party company that provides customer satisfaction assessment services.

⁽²⁾ Customer satisfaction of TOP Solvent Company Limited (TOPNEXT International Company Limited) for 2020-2022 has a full score of 5. The survey was conducted by TOP Solvent Company Limited.

⁽³⁾ Customer engagement of TOPNEXT International Company Limited in 2023 has a full score of 100 percent, according to the survey conducted by the third-party company that provides customer satisfaction assessment services.

PERFORMANCE SUMMARY

THAI OIL PUBLIC COMPANY LIMITED



B Economic Performance ⁽¹⁾	Unit	2020	2021	2022	2023
Economic Value Generated					
Sales Revenue	Million THB	242,840	335,827	505,703	459,402
Economic Value Distributed					
Cost of Sales of Goods and Services ⁽²⁾	Million THB	255,300	319,555	481,137	436,164
Economic Value Retained					
EBITDA	Million THB	(2,056)	28,142	37,187	35,453
Net Profit/ (Loss)	Million THB	(3,301)	12,578	32,668	19,443
Financial Position					
Total Assets	Million THB	306,188	362,144	444,581	419,993
Total Liabilities	Million THB	186,069	239,050	285,924	251,681
Total Equity	Million THB	120,118	123,094	158,657	168,312
Financial Ratio					
Interest Coverage Ratio	Times	(0.5)	7.8	9.6	8.7
Current Ratio	Times	4	2.6	1.5	1.7
Net Debt to Equity Ratio	Times	0.7	1.4	1	0.9
Return on Total Equity ⁽⁴⁾	Percent	(2.4)	10.7	23.5	12.0
Return on Total Asset	Percent	(1)	3.9	8.2	4.5
Stock Data					
Net Profit/ (Loss) per Share	THB/ Share	(1.62)	6.17	15.63	8.70
Annual Average of Daily Closing Stock Price ⁽³⁾	THB/ Share	43.95	54.38	53.93	50.40
Market Capitalization	Million THB	89,659	110,937	114,752	120,069
Dividend Payment	THB/ Share	0.7	2.6	3.7	3.40
Dividend Yield	Percent	1.6	4.8	6.9	6.7
Book Value	THB/ Share	56.97	59.25	69.85	75.35

Remarks:

- (1) Economic performance reporting scope is aligned with the Financial Statements 2023.
- (2) Expenses related to business operations or equipment, including components, and parts of equipment or facilities.
- (3) Calculated by the annual average of daily closing stock price.
- (4) The calculation method has been adjusted according to the criteria of the Securities and Exchange Commission.



Contributions to Organizations and External Associations ⁽¹⁾

Type of Organization	Topic	Name of the Organization	Unit	2020	2021	2022	2023
Trade Associations	Support responsible oil spill management for the environment and society	International Fund for Compensation for Oil Pollution Damage	THB	833,016	0 ⁽²⁾	6,691,436 ⁽⁴⁾	8,022,619
		Oil Spill Response Limited (OSRL)	THB	1,736,839	1,740,193	2,012,460	2,255,153
		Oil Industry Environmental Safety Group Association (IESG)	THB	1,778,000	1,683,000	1,693,000	1,834,000
	Support the enhancement of competitiveness with peer industry groups through operational excellence	Petroleum Institute of Thailand (PTIT)	THB	824,381	819,309	886,553	1,075,058
		Federation of Thai Industries ^{(5), (6)}	THB	186,180	167,990	177,620	180,188
		Thai National Shippers' Council (TNSC)	THB	53,500	53,500	53,500	53,500
		Association of Private Power Producers	THB	85,600	42,800	42,800	42,800
		Thai Chamber of Commerce	THB	24,610	24,610	24,610	24,610
		Investor Club Association ⁽³⁾	THB	0	0	0	6,420
	Support the promotion of sustainable development topics in line with international standards	Board of Trade of Thailand	THB	0 ⁽²⁾	0 ⁽²⁾	25,680	0 ⁽²⁾
		Thailand Business Council for Sustainable Development (TBCSD)	THB	250,000	250,000	250,000	250,000
		Water and Environment Institute for Sustainability	THB	0	0	0	0
		Thailand Carbon Neutral Network (TCNN) ⁽⁷⁾	THB	0	0	0	0
Tax Exemption Group	Global Compact Network Thailand	THB	35,000	35,000	35,000	35,000	35,000
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	5,807,126	4,816,402	11,892,659	13,779,348

Remarks:

(1) The contribution collected from subsidiaries in Thaioil Group, covering 96% of sales revenue.

(2) Membership fee exemption.

(3) Membership renewal every 5 years.

(4) Additional financial support due to a spill case occurrence overseas.

(5) Membership fees depend on corporate total revenue in financial statements of the past two years.

(6) Membership fee for the Federation of Thai Industries has been waived for Thai Oil Power Co., Ltd. since 2021 due to termination of business, however it includes membership fee as an associate member of subsidiaries within Thaioil Group.

(7) Network for promoting cooperation in reducing Thailand's greenhouse gas emissions. No membership fee.

Occupational Health and Safety Performance ^{(1), (2)}	Unit	2020		2021		2022		2023	
		Male	Female	Male	Female	Male	Female	Male	Female
Total hours worked.	Hour	2,887,982		2,887,293		2,952,468		3,341,350	
• Employees		2,625,891	262,091	2,433,255	454,038	2,516,078	436,390	2,871,663	469,687
Total hours worked	Hour	18,085,177		13,554,027		18,890,846		21,888,660	
• Contractors		14,524,263	3,560,914	10,981,250	2,572,777	8,470,709	10,420,137	10,870,903	11,017,757
Work-related Injuries ⁽³⁾									
Fatality as a result of work-related injury	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
	Case/ Million hours worked	0		0		0		0	
		0	0	0	0	0	0	0	0
Fatality as a result of work-related injury	Case	0		1		0		1	
		0	0	0	1	0	0	1	0
	Case/ Million hours worked	0		0.07		0		0.05	
		0	0	0	0.39	0	0	0.09	0
Total recordable work-related injury rate (TRIR)	Case	2		1		1		4	
		2	0	1	0	1	0	4	0
	Case/ Million hours worked	0.69		0.35		0.34		1.2	
		0.76	0	0.41	0	0.4	0	1.39	0
Total recordable work-related injury rate (TRIR)	Case	4		4		6		4	
		4	0	3	1	5	1	4	0
	Case/ Million hours worked	0.22		0.3		0.32		0.18	
		0.28	0	0.27	0.39	0.59	0.096	0.37	0
Lost-time injury frequency rate (LTIFR)	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
	Case/ Million hours worked	0		0		0		0	
		0	0	0	0	0	0	0	0
Lost-time injury frequency rate (LTIFR)	Case	1		1		3		0	
		1	0	0	1	2	1	0	0
	Case/ Million hours worked	0.06		0.07		0.16		0	
		0.07	0	0	0.39	0.24	0.1	0	0
Near misses ⁽⁴⁾	Case	4,521		6,594		7,601		4,650	
Work-related Illnesses									
Fatality as a result of work-related ill health	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
Fatality as a result of work-related ill health	Case	0		0		0		0	
		0	0	0	0	0	0	0	0



 Occupational Health and Safety Performance ^{(1), (2)}	Unit	2020		2021		2022		2023	
		Male	Female	Male	Female	Male	Female	Male	Female
Occupational illness frequency rate (OFR)	Case	0		0		0		0	
• Employees	Case/ Million hours worked	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
	Case/ Million hours worked	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
Occupational illness frequency rate (OFR)	Case	0		0		0		0	
• Contractors	Case/ Million hours worked	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
	Case/ Million hours worked	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
Process Safety ⁽⁵⁾									
Process safety events – Tier-1	Event	1		1		1		1	
	Event/ Million hours worked	0.04		0.06		0.05		0.04	
Process safety events – Tier-2	Event	1		2		2		4	
	Event/ Million hours worked	0.04		0.12		0.09		0.16	

Remarks:

- (1) Thaioil Group applies statistical reporting standard of PTT Group in line with Occupational Safety and Health Administration (OSHA).
- (2) Thaioil Group presents 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 combines 'Potential Incident Report (PRI)' together with the Near Misses (Please see additional information in Human Health and Safety chapter).
- (5) Thaioil Group reports process safety in accordance with API RP 754.

 People ⁽⁶⁾	Unit	2020		2021		2022		2023	
		Male	Female	Male	Female	Male	Female	Male	Female
GRI 405-1 Employees ⁽¹⁾									
Total number of employees	Person	1,749		1,799		1,851		1,936	
		1,329	420	1,351	448	1,369	482	1,412	524
	Percent	76	24	75	25	74	26	73	27
Number of Employees by Level									
All Employees									
• Executives ⁽³⁾	Person	9	2	10	2	11	2	9	2
	Percent	82	18	83	17	85	15	82	18
• Management ⁽⁴⁾	Person	90	64	93	69	102	77	101	84
	Percent	58	42	57	43	57	43	55	45
• Non-management	Person	1,230	354	1,248	377	1,256	403	1,302	438
	Percent	78	22	77	23	76	24	75	25
Permanent Contract									
• Executives ⁽³⁾	Person	8	1	8	1	9	1	7	1
	Person	87	61	90	66	101	75	101	82
	Person	1,229	354	1,248	376	1,256	402	1,301	436
Temporary Contract ⁽⁷⁾									
• Executives ⁽³⁾	Person	1	1	2	1	2	1	2	1
	Person	3	3	3	3	1	2	0	2
	Person	1	0	0	1	0	1	1	2
Number of Employees by Age Group ⁽¹⁾									
• Below 30 years old	Person	492	79	471	83	438	81	459	112
	Person	524	278	545	301	591	338	611	347
	Person	313	63	335	64	340	63	342	65
Number of Employees by Area of work									
Permanent Contract									
• Depot	Person	2	1	2	1	2	1	3	2
	Person	53	143	54	151	82	185	88	197

People ⁽⁶⁾	Unit	2020		2021		2022		2023									
		Male	Female	Male	Female	Male	Female	Male	Female								
• Sriracha office (Thaioil refinery)	Person	1,269	272	1,290	291	1,285	296	1,321	325								
Temporary Contract																	
• Depot	Person	0	0	0	0	0	0	0	0								
• Bangkok office	Person	3	4	4	5	3	4	3	5								
• Sriracha office (Thaioil refinery)	Person	2	0	1	0	0	0	0	0								
Attraction																	
GRI 401-1 New Employees Hired ⁽¹⁾																	
Total number of new employees hired	Person	148		94		99		158									
		127	21	54	40	51	48	95	63								
Number of New Employees by Level																	
• Executives ⁽³⁾	Person	0	0	1	1	0	0	0	0								
• Management ⁽⁴⁾	Person	0	2	2	0	0	0	0	0								
• Non-management	Person	127	19	51	39	41	48	95	63								
Number of New Employees by Age Group																	
• Below 30 years old	Person	122	14	45	27	41	31	85	45								
• 30-50 years old	Person	5	7	8	12	10	17	10	18								
• Over 50 years old	Person	0	0	1	1	0	0	0	0								
Number of Employees by Religion ⁽¹⁰⁾																	
• Buddhism	Percent	97.88		97.61		95.73		94.47									
• Christianity	Percent	1.14		1.22		1.19		1.19									
• Islam	Percent	0.91		1.11		1.03		0.98									
• Atheism	Percent	0.06		0.06		0.05		0.05									
• Not specified	Percent					2		3.31									
Total new hire rate	Percent of total number of employees	8.46		5.23		5.35		8.16									
		9.56	5	4	8.93	3.73	9.96	6.73	12.02								
Ability to recruit employees	Percent of total number of open positions	100		90		92		92									
Cost of new employee recruitment	THB / FTE	42,000		36,000		54,000		47,000									
Retention																	
GRI 401-1 Employee Turnover ^{(1), (5)}																	
Total employee turnover	Person	47		49		92		70									
		30	17	37	12	60	32	47	23								
• Below 30 years old	Person	6	6	12	2	19	10	12	8								
• 30-50 years old	Person	4	4	5	4	6	15	7	10								
• Over 50 years old	Person	20	7	20	6	35	7	28	5								
Turnover rate	Percent of number of total employees	2.69		2.72		4.97		3.62									
		2.26	4.05	2.74	2.68	4.38	6.64	3.33	4.39								
Voluntary resignation rate	Percent of number of total employees	1.03		1.17		2.81		2.01									
		0.6	2.38	1.11	1.34	1.9	5.39	1.49	3.44								
DJSI 3.5.8 Employee Engagement																	
Employee engagement score	Percent	92		94		89		92									
		91	94	95	92	81	89	92	92								
Employee Engagement by Level																	
• Executives ⁽³⁾	Percent					100		100									
• Management ⁽⁴⁾	Percent					83		95									
• Non-management	Percent					92		91									
Employee Engagement by Age Group																	
• Below 30 years old	Percent					66		75									
• 30-50 years old	Percent					91		87									
• Over 50 years old	Percent					92		96									



People ⁽⁸⁾	Unit	2020		2021		2022		2023		
		Male	Female	Male	Female	Male	Female	Male	Female	
GRI 401-3 Parental Leave ⁽⁸⁾										
Total number of employees that took parental leave	Person	37		47		43		46		
		22	15	33	14	26	17	35	11	
Total number of employees that returned to work after taking parental leave	Person	37		47		43		46		
		22	15	33	14	26	17	35	11	
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	
Employee Development										
GRI 404-1 Average Training Hours ^{(1), (2), (10)}										
Total training hours	Hour	94,716		103,102		124,421		136,655		
		78,454	16,262	82,920	20,182	103,117	21,303	115,138	21,516	
Average training hours of all employees	Hour/ FTE/ Year	59	39	57	46	68	45	75	42	
• Executives ⁽³⁾	Hour/ FTE/ Year	138	201	157	47	83	47	34	18	
• Management ⁽⁴⁾	Hour/ FTE/ Year	46	54	56	57	74	74	59	46	
• Non-management	Hour/ FTE/ Year	60	37	56	43	67	39	76	41	
Average Training & Development by Hours and Costs ⁽¹⁰⁾										
Average training hours and costs by all types of training	Hour	293		316		351				
		THB/ FTE		266,344		296,488		349,984		
Average Training & Development hours and costs by Type of Training ⁽¹⁰⁾										
• Classroom Training	Hour	54		62		67				
		THB/ FTE		10,454		15,288		29,538		
• Coaching and On the Job Training (OJT)	Hour	221		233		262				
		THB/ FTE		251,280		275,540		313,876		
• Online Training	Hour	18		21		22				
		THB/ FTE		4,610		5,660		5,740		
Average Training Hours and Costs by Age Group ⁽¹⁰⁾										
• Below 30 years old	Hour	275		294		338				
		THB/ FTE		265,575		298,760		360,473		
• 30-50 years old	Hour	284		302		331				
		THB/ FTE		270,529		301,386		357,237		
• Over 50 years old	Hour	253		281		312				
		THB/ FTE		255,996		284,828		343,414		
Average Training Hours and Costs by Employee Level ⁽¹⁰⁾										
• Executives ⁽³⁾	Hour	327		331		335				
		THB/ FTE		292,765		301,287		347,101		
• Management ⁽⁴⁾	Hour	270		278		327				
		THB/ FTE		266,067		277,644		343,414		
• Non-management	Hour	275		281		309				
		THB/ FTE		265,873		298,495		350,682		
Individual Development Plan										
Employees who developed Individual Development Plan (IDP)	Percent	100		100		100		100		
IDP Progress	Percent	100		100		100		100		
Employees with plans on career path	Percent	98		99		99		99		

People ⁽⁶⁾	Unit	2020		2021		2022		2023		
		Male	Female	Male	Female	Male	Female	Male	Female	
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	6,658,000	5,857,000	
Executives ⁽³⁾ (Base salary and other cash incentives)	Average THB/ Person					10,787,000	10,180,000	11,224,000	9,981,000	
Management ⁽⁴⁾ (Base salary only)	Average THB/ Person					2,227,000	1,937,000	2,269,000	1,991,000	
Management ⁽⁴⁾ (Base salary and other cash incentives)	Average THB/ Person					3,743,000	3,231,000	3,824,000	3,327,000	
Non-management (Base salary only)	Average THB/ Person					582,000	612,000	574,000	598,000	
Non-management (Base salary and other cash incentives)	Average THB/ Person					1,095,000	1,117,000	1,085,000	1,099,000	
Executives ⁽³⁾ (Base salary only)	Ratio of average salary of women to men					0.91		0.88		
Executives ⁽³⁾ (Base salary and other cash incentives)	Ratio of average salary of women to men					0.94		0.89		
Management ⁽⁴⁾ (Base salary only)	Ratio of average salary of women to men					0.87		0.88		
Management ⁽⁴⁾ (Base salary and other cash incentives)	Ratio of average salary of women to men					0.86		0.87		
Non-management (Base salary only)	Ratio of average salary of women to men					1.05		1.04		
Non-management (Base salary and other cash incentives)	Ratio of average salary of women to men					1.02		1.01		
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 labor practice grievances	Case	0		0		0		0		
• Resolved grievances	Case	0		0		0		0		
• Grievances under investigation	Case	0		0		0		0		
Labor Union										
Number of employees in the Labor Union	Percent	74.65		75.24		75		75		

Remarks:

- (1) Included data of the employees 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 management consists of Vice President and Section Manager.
- (5) The turnover rate includes voluntary resignation, retirement, asked to resignation, employee laid off, and fatality.
- (6) The scope of reporting includes only Thai Oil 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, requiring 45 days. Male employees have 12 days of parental leave, which is also higher than the Labor Law, requiring 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 074-075).
- (10) FTE or Full Time Equivalent is the number of working hours per full-time employee per year.

 Society and Community Development	Unit	2020	2021	2022	2023
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 Learning Center	Visit	53,642	22,223	32,114	42,430
Community engagement score	Percent	94.89	96.74	95.85	95.19
Number of employee volunteer hours	Hour	16,470	12,488	6,450	7,488
Value of employee volunteering during paid hours	Million THB	12.4	5.12	4.61	4.66
Cost of management	Million THB	33	31	36	38.73
 Supply Chain Management ⁽¹⁾	Unit	2020	2021	2022	2023
Supplier Screening					
Total number of Tier-1 suppliers	Number of suppliers			1,025	1,015
Total number of significant suppliers in Tier-1	Number of suppliers			41	37
Total spend on significant suppliers in Tier-1	Percent			23	11
Total number of significant suppliers in Non Tier-1	Number of suppliers			10	0
Total number of significant suppliers (Tier-1 and Non Tier-1)	Number of suppliers			51	37
Supplier Assessment					
Total number of significant suppliers assessed via desk assessments/on-site assessments	Number of suppliers			45	32
Significant suppliers assessed	Percent			88	86
Target of significant suppliers assessed	Percent			80	85
Number of significant suppliers assessed with substantial actual/ potential negative impacts	Number of suppliers			7	0
Significant suppliers with substantial actual/ potential negative impacts with agreed corrective action/ improvement plan	Percent			100	100
Number of significant suppliers with substantial actual/ potential negative impacts that were resolved	Number of suppliers			0	0
Corrective action plan support					
Total number of significant suppliers supported in corrective action plan implementation	Number of suppliers			7	0
Significant suppliers assessed with substantial actual/ potential negative impacts supported in corrective action plan implementation	Percent			100	100
Target of significant suppliers assessed with substantial actual/ potential negative impacts supported in corrective action plan implementation	Percent			100	100
Capacity building programs					
Total number of significant suppliers in capacity building programs	Number of suppliers			24	30
Significant suppliers in capacity building programs	Percent			47	81
Target of significant suppliers in capacity building programs	Percent			50	50
GRI 308-1 and GRI 414-1 Suppliers					
New suppliers acknowledged SCOC	Percent	100	100	100	100
Supplier satisfaction score	Percent	94	93	98	98

Remarks:

(1) Data covers all suppliers in the Company's database system, however crude and feedstock suppliers are excluded.

 Customer Responsibility Management	Unit	2020	2021	2022	2023
GRI 308-1 and GRI 414-8 Customers					
Customer engagement index ⁽¹⁾	Percent	98	94	95	94

Remarks:

(1) Customer engagement index includes Thai Oil Public Company Limited, Thai Lube Base Public Company Limited, and Thai Paraxylene Company Limited. The survey was conducted by a third-party company that provides service on the customer satisfaction surveys.

Environmental Performance	Unit	2020	2021	2022	2023
Refinery throughput ⁽¹⁾	Metric Ton	13,478,448	13,664,652	14,294,851	14,938,285
Energy and chemicals production	Million barrels of crude oil equivalent (MBOE) ⁽¹²⁾	98	97	104	109
Environment-Related Expenditure					
Total Environment-Related Expenditure	Million THB	11,991	15,294	23,405	19,712
• Capital investment on energy efficiency improvement	Million THB	57.4	425	13.14	0
• Expenses to operate environmental management system	Million THB	11,934	14,869	23,392	19,497
Investment benefits ⁽¹¹⁾	Million THB	112	65	74	215
Energy Management and Greenhouse Gases ^{(2), (4)}					
Total energy consumption ⁽²⁾	Million GJ	44.66	47.18	47.34	49.76
Refinery energy intensity	GJ / BOE ⁽¹²⁾	0.46	0.49	0.45	0.46
Non-renewable energy consumption	Million GJ	44.66	47.18	47.34	49.76
	Megawatt-Hour	12,404,307	13,108,617	13,149,763	13,820,127
Renewable energy consumption	Million GJ	0	0	0	5,060
	Megawatt-Hour	0	0	0	1,406
Total fuel consumption ⁽²⁾	Million GJ	50.26	52.76	52.74	54.52
Refinery fuel consumption intensity	GJ / BOE ⁽¹²⁾	0.51	0.54	0.51	0.50
• Natural gas	Million GJ	33.1	33.32	34.43	34.38
• Fuel oil	Million GJ	5.195	4.30	4.27	4.94
• Fuel gas	Million GJ	10.85	14.07	12.87	14.34
• Coke	Million GJ	1.09	1.04	0.98	0.84
• LPG	Million GJ	Less than 0.01	Less than 0.01	Less than 0.01	Less than 0.01
• Diesel	Million GJ	0.021	0.016	0.019	0.016
• 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	972,237	980,290	1,059,335	1,123,932
	Million GJ	3.5	3.53	3.81	4.05
Electricity purchased from external source	Megawatt-Hour	0	0	0	21,561
Electricity sold ⁽⁴⁾	Megawatt-Hour	1,556,176	1,548,619	1,499,678	1,324,051
Energy consumption reduction	GJ	762,264	312,741	138,473	464,839
Investments in renewable energy	Million THB	1,442	1,413	1,624	1,831
Direct greenhouse gas emissions (Scope 1) ⁽³⁾	Million tons of CO2 equivalent	3.03	3.15	3.26	3.38
• Stationary combustion	Tons of CO2 equivalent			3,262,488	3,215,700
• Mobile Combustion	Tons of CO2 equivalent			1,516	1,377
• Fugitive emission	Tons of CO2 equivalent			0	0
• Process (Electricity distributions system/ Refrigerant-Cooling system/ Fire extinguisher)	Tons of CO2 equivalent				159,086
Indirect greenhouse gas emissions (Scope 2) ⁽³⁾	Tons of CO2 equivalent	0	0	0	8,244
• Location based	Tons of CO2 equivalent				8,244
• Market based	Tons of CO2 equivalent				NAP
Greenhouse gas emissions intensity (Scope 1 and 2)	Tons of CO2 equivalent/ BOE ⁽¹²⁾	0.031	0.032	0.031	0.031
Greenhouse gas emissions reduction (Scope 1) as a result of energy efficiency improvement projects	Tons of CO2 equivalent	51,084	17,545	16,759	28,003
Methane emission	Ton	61.59	61.20	63.39	63.97
	Percent of gross direct GHG emissions (Scope 1)	0.05	0.049	0.058	0.060
Air Emission ^{(5), (6)}					
• Nitrogen Oxides emissions (NO _x)	Ton	4,526	4,527	4,426	4,461
• Sulphur Oxides emissions (SO _x)	Ton	6,612	5,197	6,542	6,889
• Volatile Organic Compounds emissions (VOCs)	Ton	1,297	1,270	1,275	1,137



Environmental Performance	Unit	2020	2021	2022	2023
Waste Management					
Total waste generated	Ton		5,889	11,250	14,273
Total waste generated and managed	Ton	10,820	5,862	10,950	10,311
• Hazardous waste generated	Ton	8,201	5,078	9,586	9,750
• Non-hazardous waste generated	Ton	2,619	784	1,364	561
Total waste leftover onsite at the end of the year	Ton		27	327	3,962
• Total hazardous waste leftover onsite at the end of the year	Ton		25	68	2,411
• Non-hazardous waste leftover onsite at the end of the year	Ton		2	259	1,551
Total waste diverted from disposal	Ton	10,786	5,856	10,950	10,639
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
• Others ⁽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
• Others ⁽⁷⁾	Ton	0	0	0	0
Offsite	Ton	10,786	5,856	10,950	10,639
Total hazardous waste utilized	Ton	8,167	5,078	9,586	9,819
• By reusing	Ton	0	0	0	0
• By recycling	Ton	1,312	944	1,084	411
• Others ⁽⁷⁾	Ton	6,855	4,134	8,502	9,408
Total non-hazardous waste utilized	Ton	2,619	778	1,364	820
• By reusing	Ton	0	0	0	0
• By recycling	Ton	2,448	432	441	0
• By recycling as alternative energy	Ton	171	346	923	820
• Others ⁽⁷⁾	Ton	0	0	0	0
Total waste disposed	Ton	34	6	0	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
• By landfill	Ton	0	0	0	0
• Others ⁽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
• By landfill	Ton	0	0	0	0
• Others ⁽⁷⁾	Ton	0	0	0	0
Offsite	Ton	34	6	0	0
Total hazardous waste disposed	Ton	34	0	0	0
• By incineration with energy recovery	Ton	0	0	0	0
• By incineration without energy recovery	Ton	6	0	0	0
• By landfill	Ton	0	0	0	0
• Others ⁽⁷⁾	Ton	28	0	0	0
Total non-hazardous waste disposed	Ton	0	6	0	0
• By incineration with energy recovery	Ton	0	6	0	0
• By incineration without energy recovery	Ton	0	0	0	0
• By landfill	Ton	0	0	0	0
• Others ⁽⁷⁾	Ton	0	0	0	0
Oil and Chemical Spill ⁽⁸⁾					
Significant oil and chemical spills on land	Case	0	0	0	0

Environmental Performance	Unit	2020	2021	2022	2023
Significant oil and chemical spills in the sea	Case	0	0	0	1
Environmental Laws and Regulations Compliance					
Fines for non-compliance with environmental laws and regulations	Million THB	0	0	0	0
Number of non-compliance with environmental laws and regulations incidents	Incident	0	0	0	0



Environmental Performance	Unit	Water				Water in water-stressed areas 2023
		2020	2021	2022	2023	
Water⁽⁹⁾						
Water withdrawal by source	Total seawater ⁽¹⁰⁾	Million m ³	18.41	18.19	18.19	19.74
	• Freshwater (≤ 1,000 mg/ L Total Dissolve Solids)	Million m ³	0	0	0	0
	• Other water <td>Million m³</td> <td>18.41</td> <td>18.19</td> <td>18.19</td> <td>19.74</td>	Million m ³	18.41	18.19	18.19	19.74
	Total water withdrawal from other sources	Million m ³	3.34	3.88	3.67	4.16
	• Freshwater (≤ 1,000 mg/ L Total Dissolve Solids)	Million m ³	3.34	3.88	3.67	4.16
	• Other water <td>Million m³</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>	Million m ³	0	0	0	0
	Total third-party water withdrawal by source	Million m ³	3.34	3.88	3.67	4.16
	Surface water	Million m ³	0	0	0	0
	Groundwater	Million m ³	0	0	0	0
	Seawater	Million m ³	0	0	0	0
	Produced water	Million m ³	0	0	0	0
Water withdrawal	From all water sources	Million m ³	21.75	22.07	21.86	23.90
Water discharge by destination	Discharged into the sea	Million m ³	17.43	18.10	18.74	20.05
Total water discharge ⁽⁷⁾	All discharge destinations	Million m ³	17.43	18.10	18.74	20.05
Total water discharge by treatment level	Freshwater (≤ 1,000 mg/ L Total Dissolve Solids)	Million m ³	0	0	0	0
	Other water <td>Million m³</td> <td>17.43</td> <td>18.10</td> <td>18.74</td> <td>20.05</td>	Million m ³	17.43	18.10	18.74	20.05
Water consumption for industrial purposes	Total water consumption	Million m ³	4.32	3.97	3.11	3.84
	Total net freshwater consumption in water-stressed areas ⁽¹³⁾	Million m ³	0	0	0	0

Remarks:

- (1) Refinery Throughput includes crude oil and other refinery feedstock.
- (2) Energy consumption covers TOP, TPX, TLB, LABIX, and TOPSPP. The amount of fuel, steam, and electricity is calculated in accordance with GRI 302 (2016). The energy conversion factors are specific values gathered from Thaioil Group and subsidiaries' laboratory.
- (3) 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.
- (4) There is no steam sold to external organization.
- (5) Thaioil Group operates, evaluates, and monitors occupational health and safety and environmental performance by following Shell International Practice Standard (2007).
- (6) Thaioil Group does not purchase ozone-depleting chemicals, such as CFCs, HCFCs, Halons, and Methyl Bromide.
- (7) The other waste disposal methods cover incineration in industrial incinerators and external wastewater treatment.
- (8) Oil and chemical spills that are greater than 1 Barrel to sea and leak over 100 Barrels to land are considered significant.
- (9) Data excludes 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 insignificant.
- (10) The amount of seawater withdrawal and water discharge covers excess seawater that has been discharged as freshwater by desalination process from the desalination unit.
- (11) Investment benefit include cost saving from environmental-related activities and tax benefits.
- (12) Barrel Oil Equivalent means the production amount of petroleum and petrochemical product equivalent to 1 Barrel of crude oil.
- (13) Thaioil Group has not consumed fresh water in the production process from water-stressed areas.



ASSURANCE STATEMENT

LRQA Independent Assurance Statement

Relating to Thai Oil Public Company Limited's Environmental and Social Disclosures within the Integrated Report for the calendar year 2023

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 2023 ("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, 305-4, 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 and DJSI no 1.7.5 (2023 version) and 1.7.6 (2023 version) regarding critical supplier assessment

Note: - For safety performance data (disclosure 403-9, 403-10), TOP's operations and activities in Bangkok and expansion projects within Sriracha area were covered.
- For critical supplier assessment, crude oil was excluded.

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 gradually improved the stakeholder engagement processes over time. However, we believe TOP should establish a database to keep all the gathered evidence accompanying this engagement process.
- Materiality: TOP's materiality assessment has effectively identified the issues to be reported. The issues are then reported clearly; specifically describing how TOP is:
 - addressing the issue(s) from both a local and global context
 - allocating resources to improve sustainability performance, as well as any achievement of these performance targets.
- Responsiveness: TOP has implemented key performance indicators (KPIs) to address stakeholders' needs and expectations. For example: Energy Intensity Index contributes towards GHG reduction by reporting on energy reduction projects. However, we believe that future TOP Integrated Reports should align their KPIs with science-based targetsⁱ designed to provide companies with a clearly-defined pathway to reduce GHG emissions in line with the Paris Agreement goals.
- Reliability: At the aggregated level, TOP has established and maintained, a consistent data collection system. However, to further improve data accuracy, we believe that TOP should focus their QA/QC checks on datasets that are complex and involve manual data transposition. For example: the GHG inventory and clear procedure in evaluation of critical supplier non-tier 1.

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 Tanasuthiseri

LRQA Lead Verifier

On behalf of LRQA Ltd.

LRQA (Thailand) Limited

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LR reference: BGK64324041549535

Dated: 16 February 2024

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ⁱ <https://sciencebasedtargets.org>

GRI, UNGC PRINCIPLES COP, AND TCFD FRAMEWORK INDICES

THAI OIL PUBLIC COMPANY LIMITED

GRI INDEX		
General Disclosure		
GRI Topics	Disclosure Page/ Website	External Assurance
The Organization and Its Reporting Practices		
2-1	001, 008-009	
2-2	001	
2-3	001	
2-4	Website 	
2-5	074-075	
Activities and Workers		
2-6	008-009, 010-011	
2-7	008, 066-067	
2-8	066-067	
Governance		
2-9	Website 	
2-10	Website 	
2-11	Thaioil Group's Annual Report (56-1 One Report): Board of Directors Chapter	
2-12	025-026	
2-13	025-026	
2-14	025-026	
2-15	Website 	

GRI INDEX		
General Disclosure		
GRI Topics	Disclosure Page/ Website	External Assurance
2-16		
2-17	Website 	
2-18		
2-19	Thaioil Group's Annual Report (56-1 One Report): Remuneration policies	
2-20	Thaioil Group's Annual Report (56-1 One Report): Process to determine remuneration	
2-21	069	Yes
Strategy, Policies, and Practice		
2-22	002-003	
2-23	002-003, 025-026	
2-24	025-026	
2-25		
2-26	Website 	
2-27		
2-28	064	
Stakeholder Engagement		
2-29	012-014	
2-30	069, Website 	
Material Topics		
3-1	014-016	Yes
3-2	016-020	Yes

Topic Specific and Sector Standard Disclosure							
Thaioil Sustainability Material Topics		GRI Topic	Disclosure	GRI SECTOR STANDARD 11: Oil and Gas	Page or Website	Comments/ Omissions	External Assurance
Environmental Management System		GRI 3: Management of Material Topic	3-3	11.2.1	028-037		
				11.3.1	028-037		
				11.4.1	Website 		
		GRI 304: Biodiversity 2016	304-2	11.4.3			
		GRI 306: Effluents and Waste 2016	306-3	11.8.2	034, 072-073		Yes
		GRI 307: Environmental Compliance 2016	307-1	-	034, 073		
Climate and Net Zero Strategy, and Air Quality Management		GRI 305: Emissions 2016	305-7	11.3.2	037, 071		Yes
		GRI 3: Management of Material Topic	3-3	-	038-048		
		GRI 201: Economic Performance 2016	201-2	11.2.2	041-045		
		GRI 303: Water and Effluents 2018	303-2	11.6.3	073		
		GRI 305: Emissions 2016	305-1	11.1.5	046, 071		Yes

Topic Specific and Sector Standard Disclosure						
Thaioil Sustainability Material Topics	GRI Topic	Disclosure	GRI SECTOR STANDARD 11: Oil and Gas	Page or Website	Comments/ Omissions	External Assurance
	GRI: Sector Standard: Oil and Gas 2021 (Additional Sector Disclosure)	305-2	11.1.6	047, 071		Yes
		305-3	11.1.7	047-048		
		305-4	11.1.8	046, 071		Yes
		305-5	11.2.3	045-048		
		N/A	11.2.4	N/A	Thaioil Group aligns our climate change commitment with Thailand's Net Zero GHG Emissions targets.	
Circular Economy	GRI 3: Management of Material Topic	3-3	11.1.1	Website 		
			11.5.1			
			11.6.1			
	GRI 302: Energy 2016	302-1	11.1.2		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			
			303-1		The standard, methodologies and consumptions used to calculate water withdrawal are not reported.	Yes
	GRI 303: Water and Effluents 2018	303-2	11.6.2			
			303-2			
			303-3			
			303-4			
			303-5			
	GRI 306: Waste 2020	306-1	11.5.2			
			306-2			
			306-3			Yes
			306-4			Yes
			306-5			Yes
Human Rights	GRI 3: Management of Material Topic	3-3	11.11.1	Website 		
	GRI 402: Labour Management Relations 2016	402-1	11.10.5			
	GRI 405: Diversity and Equal Opportunity 2016	405-1	N/A			
		405-2	11.11.5			Yes
	GRI 406: Non-discrimination 2016	406-1	11.11.6			
	GRI 409: Forced or Compulsory Labor 2016	409-1	11.12.2			
Human Health and Safety	GRI 412: Human Rights Assessment 2016	412-1	N/A			
	GRI 3: Management of Material Topic	3-3	11.8.1			
			11.9.1			
	GRI: Sector Standard: Oil and Gas 2021 (Additional Sector Disclosure)	OG13	11.8.3 & 11.8.4			
			052-053, 066			
			403-1			
			403-2			
			403-3			
	GRI 403: Occupational Health and Safety 2018	403-4	11.9.4			
			11.9.5			
			11.9.6			
			11.9.7			
			11.9.8			
			11.9.9			
			11.9.10		051-052, 065-066	Yes



Topic Specific and Sector Standard Disclosure

Thaioil Sustainability Material Topics	GRI Topic	Disclosure	GRI SECTOR STANDARD 11: Oil and Gas	Page or Website	Comments/ Omissions	External Assurance	
		403-10a, 403-10b	11.9.11	051-052, 065-066		Yes	
Human Capital Development, and Talent Attraction & Retention	GRI 3: Management of Material Topic	3-3	11.10.1	Website 			
	GRI 401: Employment 2016	401-1	11.10.2	067			
		401-2	11.10.3	Website 			
		401-3	11.10.4	068			
	GRI 404: Training and Education 2016	404-1	11.10.6	068			
		404-2	11.10.7	Website 			
		404-3	11.10.8	068			
	GRI 3: Management of Material Topic	3-3	11.14.1	Website 			
			11.15.1				
	GRI 203: Indirect Economic Impacts 2016	203-1	11.14.4				
		203-2	11.14.5				
	GRI 413: Local Communities 2016	413-1	11.15.2				
		413-2	11.15.3				
	GRI: Sector Standard: Oil and Gas 2021 (Additional Sector Disclosure)	N/A	11.15.4				
Governance, and Business Ethics and Code of Conduct	GRI 3: Management of Material Topic	3-3	11.20.1	Website 			
	GRI 205: Anti-Corruption 2016	205-1	11.20.2				
		205-2	11.20.3				
		205-3	11.20.4				
	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			
Digital Transformation	GRI 3: Management of Material Topic	3-3	N/A	Website 			
Business Diversifications	GRI 3: Management of Material Topic	3-3	N/A	021-024			
Innovation & Customer Relationship Management	GRI 3: Management of Material Topic	3-3	N/A	054-062			
Sustainable Supply Chain Management	GRI 3: Management of Material Topic	3-3	11.12.1	Website 			
	GRI 308: Supplier Environmental Assessment 2016	308-1	N/A	070			
		308-2	N/A	070			
	GRI 414: Supplier Social Assessment 2016	414-1	11.12.3	070			
		414-2	11.10.9	070			
Closure and Rehabilitation	GRI 3: Management of Material Topic	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			
	GRI 404: Training and Education 2026	404-2	11.7.3	N/A			
		GRI: Sector Standard: Oil and Gas 2021 (Additional Disclosures)	11.7.4	N/A			
			11.7.5				
			11.7.6				
Land and Resource Rights	GRI 3: Management of Material Topic	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			
Reporting on Land and Resource Rights	GRI 3: Management of Material Topic	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).		
	GRI 411: Rights of Indigenous People 2016	411-1	11.17.2	N/A			
	GRI: Sector Standard: Oil and Gas 2021 (Additional Disclosures)	N/A	11.17.3	N/A			
			11.17.4				

Topic Specific and Sector Standard Disclosure							
Thailoil Sustainability Material Topics	GRI Topic	Disclosure	GRI SECTOR STANDARD 11: Oil and Gas	Page or Website	Comments/ Omissions	External Assurance	
Payments to Governments	GRI 3: Management of Material Topic	3-3	11.21.1	Website 			
	GRI 201: Economic Performance 2016	201-1	11.21.2				
		201-2	11.21.3				
	GRI 207: Tax 2019	207-1	11.21.4				
		207-2	11.21.5				
		207-3	11.21.6				
	GRI: Sector Standard: Oil and Gas 2021 (Additional Disclosures)	N/A	11.21.8				
Public Policy	GRI 3: Management of Material Topic	3-3	11.22.1	Website 			
	GRI 415: Public Policy 2016	415-1	11.22.2				



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	Website 
	Principle 2 Businesses should make sure that they are not complicit in human rights abuses	
Labour	Principle 3 Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining	Website 
	Principle 4 The elimination of all forms of forced and compulsory labour	
	Principle 5 The effective abolition of child labour	
	Principle 6 The elimination of discrimination in respect of employment and occupation	
Environment	Principle 7 Businesses should support a precautionary approach to environmental challenges	038-048 Website 
	Principle 8 Undertake initiatives to promote greater environmental responsibility	
	Principle 9 Encourage the development and diffusion of environmentally friendly technologies	
Anti-corruption	Principle 10 Businesses should work against corruption in all its forms, including extortion and bribery	Website 

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
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.
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
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

SDGs PROGRESS

THAI OIL PUBLIC COMPANY LIMITED

Thaioil Group has assessed and analyzed the impacts of Environment, Social, and Governance (ESG) activities through materiality assessment. The Company has prioritized the management of negative impacts and strengthened positive impacts by setting targets that are aligned with the United Nations Sustainable Development Goals (SDGs). The process of Thaioil's assessment, monitoring, and reporting was developed based on "Integrating the SDGs into Corporate Reporting: A Practical Guide" which was established by the Global Reporting Initiative (GRI) and UN Global Compact (UNGC).

Thaioil's Commitment



In 2023, Thaioil Group determined 14 targets which are aligned with 9 out of the 17 United Nations Sustainable Development Goals (SDGs). The details of Thaioil's progress are shown in the table below:



UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	2023 Progress	More Information
SDG 3: Good Health and Well-being 	3.8 Achieve universal health coverage, including financial risk protection, access to quality essential healthcare services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all.	To support accessibility of public health services for the communities in Laem Chabang District, Chonburi Province, and other remote areas.	<p>Thaioil Group's Health and Learning Center for Community:</p> <ul style="list-style-type: none"> 42,430 beneficiaries accessed the Thaioil Group's Health and Learning Center. <p>Health Promotion Project</p> <ul style="list-style-type: none"> Organized 39 sessions for activities to brighten the mind, body flexibility, and improve balance with yoga, with a total of 40 participants per session. Organized 3 events for "the 5-month walk-run dedication to 100,000 km", with 150 participants per event. <p>Community Health Check-ups:</p> <ul style="list-style-type: none"> 205 community households received home visits for preliminary health check-up assessments. 736 community members received screening tests for chronic non-communicable diseases (diabetes and hypertension). 	Corporate Social Responsibility 
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 opportunities for community members of every gender, age, and promote the quality and development of basic education together with the promotion of educational development projects with educational institutions and scholarships supports.	<p>Sponsored the teachers in skill development in the fields of Science, Technology, and Engineering, and promoted students' skills in sports through 5 projects under the PTT Group Model School and CONNEXT ED.</p> <p>Developed 2 Science and English Teachers as change-makers through Teach for Thailand program.</p>	Corporate Social Responsibility 
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 in the top quartile of Energy Intensity Index (EII) in the global oil and gas industry by 2026.</p> <p>To support accessibility to clean energy for local communities and other remote communities together with the development of alternative energy and the promotion of energy efficiency.</p>	<p>Energy Intensity Index (EII) of Thaioil's refinery at 82.9 and ranked among leading companies in the oil and gas industry globally.</p> <p>Installed solar power systems for 3 hospitals and community health centers with a total capacity of 72 kilowatts and 5 border patrol police schools with a total capacity of 20.7 kilowatts.</p>	Circular Economy  <p>Corporate Social Responsibility </p>

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	2023 Progress	More Information
SDG 8: Decent Work and Economic Growth 	<p>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 (MSMEs), including through access to financial services.</p>	<p>To support job creation and sustainable self-reliance in local communities and other remote communities through social enterprise projects.</p>	<p>Organized a job training course for 7 people in the Laem Chabang community to promote community economy and support community members to have primary and secondary income. As a result, the community members who participated in the job training course were able to generate 210,000 THB of income through the community product project of Thaioil Group.</p>	<p>Corporate Social Responsibility</p> 
	<p>8.8 Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.</p>	<p>To achieve a total recordable injury frequency rate (TRIFR) of Thaioil Group at 0.32 cases per million hours worked for all employee and contractor which is higher than the target of less than 0.30 cases per million hours worked. However, Thaioil Group continued to maintain the performance in the top 10% among companies in the oil and gas industry.</p>	<p>Total recordable injury frequency rate (TRIFR) of Thaioil Group at 0.32 cases per million hours worked for all employee and contractor which is higher than the target of less than 0.30 cases per million hours worked. However, Thaioil Group continued to maintain the performance in the top 10% among companies in the oil and gas industry.</p>	<p>Human Health and Safety Page 049-053 or</p> 
		<p>To achieve zero incident of process safety: Loss of Primary Containment (LOPC) Tier-1.</p>	<p>1 LOPC Tier-1 event, equivalent to 0.04 cases per million hours worked.</p>	
		<p>To implement the Human Rights Due Diligence process in Thaioil operations and to assess human rights risks for all critical suppliers.</p>	<p>The human rights risk assessment covered 100% of the business activities of Thaioil Group and of suppliers. The sufficient risk management plan and mitigation measures have been developed for all identified risks.</p>	<p>Human Rights</p> 
SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation 	<p>9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, especially in developing countries, including encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.</p>	<p>To promote an innovative culture and enhance business opportunities in innovation.</p>	<p>According to the evaluation assessment of the innovation maturity level of Thaioil Group, the Company's innovation level was at level 3 out of 5 levels.</p>	<p>Innovation & Customer Stewardship Page 054-062 or</p> 

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	2023 Progress	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 maximization of the efficiency despite limited resources by efficient production processes and utilization of natural resources.	37% of freshwater consumption was replaced by distilled water from desalination. 100% of waste diverted from disposal by 3Rs method (Reduce, Reuse, Recycle).	Circular Economy 
	12.4 Achieve the environmentally sound management of chemicals and all waste 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 of natural resource consumption to minimize impacts to environment and society	4,661 tons of NO _x emissions. 6,889 tons of SO _x emissions. 1,137 tons of VOCs emissions.	Environmental Impact Management Page 028-037 or 
	12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse.	To achieve the business target following the circular economy principles for efficient consumption of limited resources and waste generation reduction.	Zero Waste to Landfill.	Circular Economy 
	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 Environment, Social, and Governance (ESG) practices with suppliers.	100% of new suppliers acknowledged Thaioil Group Supplier Code of Conduct (SCOC) and responded to the ESG self-assessment survey. Increased spending on environmental-friendly products for the materials, equipment, and office supplies product group by 5% compared to the previous year. This was equivalent to 1,568 tons of carbon dioxide reduction.	Sustainable Supply Chain Management 
	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.	Achieved Net Zero GHG Emissions organization by 2060.	Emission intensity of GHG scope 1 & 2 0.0310 tons of carbon dioxide equivalent per barrel of crude oil equivalent, maintain as the previous year. 931,282 tons of carbon dioxide equivalent of avoided emissions from the use of low-carbon products.	Climate Change Management Page 038-048 or 



UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	2023 Progress	More Information
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 increase areas of forest and mangrove to create a balanced ecosystem in the community which absorbs carbon. This aims to foster Thaioil Group's Net Zero GHG Emissions by 2060.	Implemented afforestation and mangrove reforestation projects for benefits of carbon credit. As a result, the project is expected to absorb over 92,800 tons of carbon dioxide equivalent throughout the 10-year project duration.	Corporate Social Responsibility 
SDG 16: Peace, Justice, and Strong Institutions 	16.5 Substantially reduce corruption and bribery in all 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 in any cases.	Zero case of non-compliance with laws and regulations, or conducts that could lead to corruption and bribery by Thaioil Group's employees. 100% of Thaioil Group's employees responded to the annual conflict of interest reporting.	Fight Against Corruption 

SURVEY OF READERS' OPINIONS



The information from the Survey of Readers' Opinions of the 2023 Integrated Report will be used to enhance and develop the Integrated Report for the next year.

Thank you for your kind cooperation.

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the Survey

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

1. Which group of readers would you describe yourself?

<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

Customer Relationship Management	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor
Business Diversification	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor

Environmental Dimension

Climate and Net Zero Strategy	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor
Environmental Management System	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor

Social Dimension

Human Health and Safety	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor
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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 of Thaioil Group's performances and strategies	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor
The content's appropriateness and reliability	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor
The content's relevance to your interests	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Poor

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

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If not, please specify the topic(s) that you think should be addressed.

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7. Please provide feedback or suggestions for further improvement in the next annual Integrated Report

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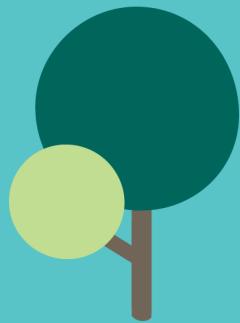
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