

building on  
our strong  
foundation

# toward the sustainable Next Normal



Integrated  
Report  
2021

Thai Oil  
Public Company Limited



# ABOUT THIS REPORT



Thai Oil Public Company Limited is committed to disclose all material information on corporate sustainability to our stakeholders with the utmost accuracy and transparency. In line with this commitment, we have been publishing annual corporate sustainability reports aligned with international standards since 2011. This report is the 11<sup>th</sup> of its kind, and covers our economic, social, and environmental performance from 1<sup>st</sup> January to 31<sup>st</sup> December 2021

## Approach to Reporting

The 2021 Integrated Report follows the Integrated Reporting Framework of the Value Reporting Foundation, and reports on the management approach and performance of the material sustainability topics identified through a materiality assessment process in accordance with the Global Reporting Initiative (GRI) Standards: Core Option. Additional indicators for the Oil and Gas Sector Disclosures (OGSD) are reported on page 142-145. The Report also outlines the progress on the United Nations Global Compact 10 Principles (UNGC) on page 145 and the progress towards the United Nations Sustainable Development Goals (SDGs) on page 146-150 as well as the Task Force on Climate-Related Financial Disclosures (TCFD) on page 145. Reported information on environment and safety has been verified by an external verifier, with the statement of the assurance shown on page 140-141.

## Scope of Reporting

The scope of reporting has been determined based on the business relevance and the level of impacts towards Thaioil's core businesses - oil refining, petrochemical production, lube base oil business, power generation, and other businesses. The coverage extends to only the 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). Additional reporting for TOP Solvent Company Limited (TS) only covers information on product and service stewardship. In total, this determined scope of reporting covers 96% of Thaioil Group's sales revenue.

To download an electronic version of the 2021 Integrated Report, please visit:  
[https://www.thaioilgroup.com/home/media\\_ebook.aspx?id=273&lang=en](https://www.thaioilgroup.com/home/media_ebook.aspx?id=273&lang=en)



For information on the performance of Thaioil Group companies not included in the scope of this Report, please refer to the 2021 Annual Report (Form 56-1 One Report) at <https://investor.thaioilgroup.com/ar.html>



For more information, please contact:

Sustainability Development Function,  
 Corporate Secretary and Sustainability  
 Department



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

Email: [sustainability@thaioilgroup.com](mailto:sustainability@thaioilgroup.com)  
 Website: [www.thaioilgroup.com](http://www.thaioilgroup.com)



# MESSAGE TO OUR STAKEHOLDERS



**Mr. Wirat Uanarumit**

Chief Executive Officer and President  
Thai Oil Public Company Limited

**Thai Oil Public Company Limited is driven to be a leader in the energy and chemicals business while maintaining sustainable development across the environmental, social, and governance dimensions in order to create social well-being and pursue sustainable and shared growth.**

From the beginning of being Thailand's first privately-owned oil refinery 60 years ago, Thaioil has accumulated expertise and experience, and was able to secure a strong business foundation that allowed the Company to grow into a leading fully integrated refinery and petrochemical business in the Asia-Pacific region. Despite facing numerous changes and challenges, Thaioil has continued developing our business and strengthening our competitive advantage by extending the value chain to chemical products and initiating business partnerships. With our unwavering determination, we will continue our journey towards becoming a 100-year organization that empowers human life through sustainable energy and chemicals.

The year 2021 was another challenging one for the Company. The COVID-19 pandemic continued to spread, while consumer behavior changed towards increasingly digitized ways of life. Climate change resulted in increasingly severe environmental issues, as pressure for organizations to pursue sustainable development grew. All of these factors have driven Thaioil to prioritize sustainable business transformation grounded on flexibility and resilience to changes in normal as well as emergency conditions. To that end, the Company adopted a business strategic plan that covers three main strategies:

**The Value Maximization Strategy** consists of adding value to petroleum products through investing in value chain extension to the petrochemical business, which has a variety of products (integrated crude to chemicals). The refinery business will serve as the key production base for different product groups including aromatics, olefins, chemical products, and high value products (HVP), to respond to the market and customer demand.

**The Value Enhancement Strategy** consists of expanding business to foreign countries, growing our customer base, and extending into new markets, especially those in ASEAN countries with high economic growth rates.

**The Value Diversification Strategy** consists of diversifying the Company's investment portfolio to build stable incomes through new investments in the power business and new "S-Curve" businesses - such as bio-based businesses or healthcare businesses - that are sustainable and align with energy transition trends.

Going forward, Thaioil will no longer be a company that primarily operates in the petroleum industry. We will increasingly expand our business to the petrochemicals business and other businesses, and identify new ways for our organization to sustainably create value. To reduce risks and dependency on relying too heavily on one particular revenue stream, the Company has set a long-term target to diversify the Company's revenue streams. By 2030, the revenue breakdown should consist of 40% from the petroleum business, 40% from the petrochemicals business, 10% from the power business, and 10% from other businesses.

Meanwhile, Thaioil has continued to make steady progress in key initiatives that align with the Company's business strategy,

including investments in the Clean Fuel Project (CFP). Once the construction of the CFP completed, the project will serve as a production base that supports the Company in meeting oil demand after the COVID-19 pandemic situation improves. The CFP will also allow the Company to transform low value products, such as fuel oil, into products with higher value that can extend to the petrochemicals business. Furthermore, Thaioil has invested in a leading petrochemical and olefin plant in Indonesia, which will add value to products produced by the CFP and support integration of the petrochemicals and olefins businesses in parallel.

Besides pursuing opportunities to add value to our business, Thaioil has developed a strategic plan for sustainability that is aligned with the organization's vision. The strategic plan directs the Company in managing environmental, social, and governance (ESG) risks while maintaining strong relationships with all stakeholder groups through the 3Es strategic framework. Details are presented below:

**The Enhance Environment Strategy** consists of our aspiration to achieving Net Zero Greenhouse Gas Emissions by 2060, and increasing the share of revenue from environmentally friendly business and products.

**The Engage Society Strategy** consists of engaging with our communities and society to create long-term sustainable shared value in tangible and sustainable ways through implementing corporate social responsibility projects and leveraging our expertise in sustainable energy and chemicals.

**The Ensure Good Governance and Economic Resilience Strategy** consists of ensuring transparency and building trust in corporate governance within the organization through the integration of governance, risk, and compliance (GRC) principles to strengthen internal systems and ensure readiness to respond to external challenges from rules and regulations, as well as from business expansion into new countries.

With our dedication towards sustainable excellence, Thaioil has continued to implement all activities with the utmost efficiency and on a strong foundation of sustainability. As a result, the Company has been listed as a member of the Dow Jones Sustainability Indices (DJSI) for the 9th consecutive year. This recognition affirms our organization's commitment to excellence in our operations and our alignment with international sustainability standards.

On behalf of Thaioil Group, I would like to take this opportunity to thank all stakeholder groups for their unwavering support to our organization throughout this year. I am confident that Thaioil will emerge out of this crisis and grow our business sustainably into the future. As a Company, we are ready to respond to the wide range of changes and challenges, along with creating value for the environment, economy, and society. This foundation will allow the Company to achieve our vision and continue to empower human life through sustainable energy and chemicals.

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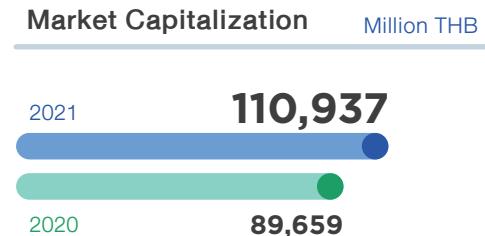
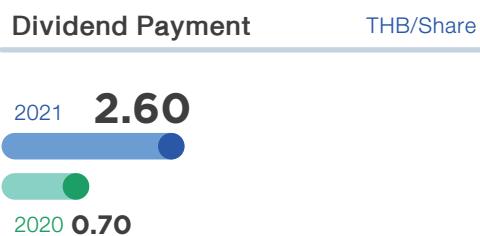
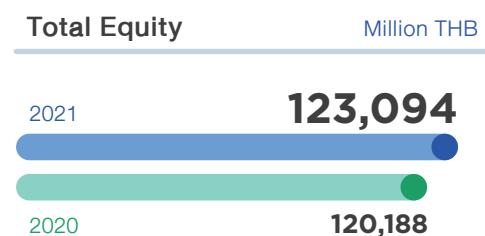
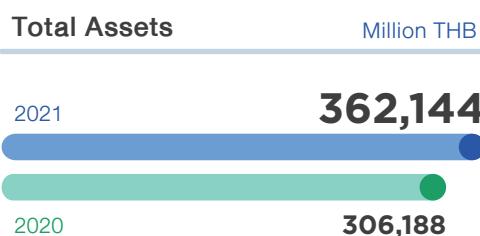
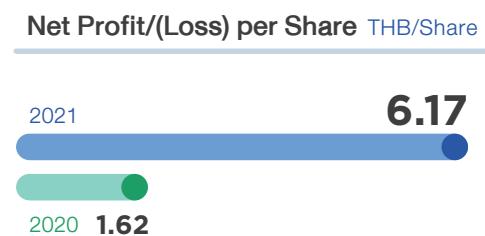
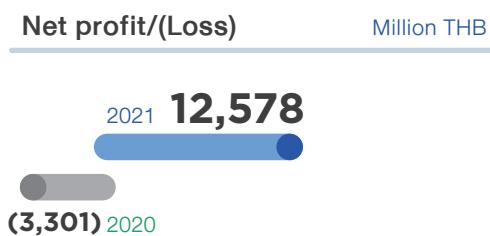
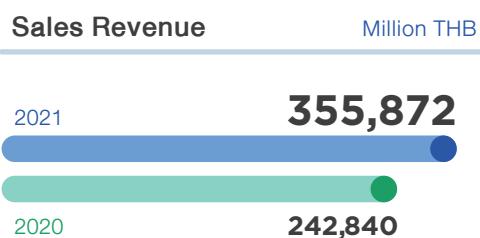
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## FINANCIAL HIGHLIGHTS



## SUSTAINABILITY HIGHLIGHTS



### Enhance Environment

Enhancing environmental management to ensure the alignment with global directions



#### Natural Capital

**17,544.75**

tons of carbon dioxide equivalents reduced by implementing energy efficiency improvement in 2021

**Zero** waste disposed to landfill

**46%**

reduction in waste generation compared to the previous year



#### Intellectual Capital

**13**

energy efficiency projects implemented in the production process from the expertise of employees



#### Manufactured Capital

**953,629**

tons of carbon credits registered with Thailand Greenhouse Gas Management Organization (TGO) between 2019-2021



#### Financial Capital

**41%**

share of environmentally-friendly product in sales revenue



**65** million Baht from energy saving

### Engage Society

Empowering community and social engagement along with long-term social value creation for stakeholders



#### Social and Relationship Capital

**96.74%**

community engagement



**No**

complaint of human rights violation

#### Human Capital

**Zero**

case of lost time injury of employees



#### Manufactured Capital

**No**

disruption in the production process



#### Intellectual Capital

**86** courses

developed by expertise of employees



### Ensure Good Governance and Economic Resilience

Maintaining trust in good corporate governance and transparency within the organization in order to strengthen the business and move towards sustainability



#### Social and Relationship Capital

**93%**

supplier satisfaction



**94%**

customer engagement

**No**

case of non-compliance with business ethics, laws and regulations that may lead to corruption

#### Human Capital

**No**

case in which Thaioil Group employees violate corporate governance, the code of conduct, and anti-corruption



#### Intellectual Capital

**4**

numbers of registered patents



#### Financial Capital

**Zero**

damage from cyber-attacks that disrupt business operations



**1,500** million Baht

of benefits gained from Crude management and Crude Re-Optimization

## ABOUT THAIOIL GROUP



### THAI OIL PUBLIC COMPANY LIMITED

**Thai Oil Public Company Limited, the largest petroleum refinery business in Thailand, has been operating for 60 years. We have a modern and highly efficient production process that allows us to produce and distribute refined petroleum, and mainly support the domestic petroleum demands. Furthermore, Thaioil extends our value chain to include upstream and downstream businesses in order to maintain business stability.**

#### VISION

Empowering human life through sustainable energy and chemicals

#### MISSION

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

#### CORPORATE VALUES



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



Headquarter :  
**Bangkok, Thailand**

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

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

Percentage of Shares Owned by PTT PLC. :  
**45.03 %**

Refinery Production in 2021 :  
**275,000** BBL per day

**100%**  
of nameplate capacity at 275,000 BBL per day

Domestic Distribution :  
**28%**  
of total domestic demand on finished oil products

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

# THAIOIL'S VALUE CHAIN AND MARKET OUTLOOK 2021



## The Clean Fuel Project

was developed to expand the Company's refining capacity to 400,000 barrels per day, increase the share of diesel and aviation fuel products produced in comparison to other products, and cease production of fuel oils, in order to respond to the market demand. (In progress)

## Euro-5 Standard Oil Production Project

(In progress)

## RHCU Pilot Plant

(Feasibility study in progress)

## Crude Oil Tank Construction

(In progress)

## New Reservoir Raw Water Line Project

(Completed)

## Electricity and Steam Production in Sriracha Project

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

## Investment in Power Business

to increase energy efficiency and alternative energy sources. (In progress)

## Investment in Petrochemical Business

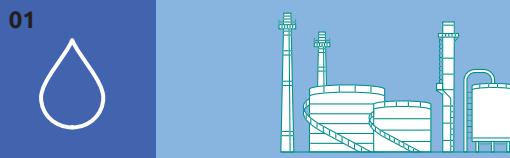
(Feasibility study in progress)

## Investment to Add Value to Heavy Naphtha

to improve the aromatics production plant to produce higher value products. (Feasibility study in progress)

## Investment in the Petrochemical Business through PT Chandra Asri Petrochemical Tbk (CAP)

to enter the market for petrochemical and high value products. (Completed)



## Oil Refinery

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

## Crude Oil Market and Refining Industry

As the COVID-19 pandemic saw improvements in 2021, average Dubai crude oil prices increased to 69 USD per barrel in 2021 from 42 USD per barrel in 2020.

The refining industry recovered from the previous year as governments eased

## Domestic Petroleum Product Market

Domestic demand for petroleum products fell by 3.1% following the decline in road transport. However, demand for fuel oil increased by 15.6% following global economic and market expansion, and consequent export growth.

The average petroleum production of oil refineries in Thailand stood at 875,596 barrels per day in 2021, a reduction from

## Power and Steam

Extended business activities that strengthen business stability, including natural gas-fired co-generation power plants that primarily support Thaioil Group's electricity consumption, and steam production that is used for other operations.

## Power Industry

The total domestic power capacity in Thailand was 46,682.4 megawatts, an increase of 2.6% from 2020.

The peak electricity demand on the EGAT (Electricity Generating Authority of Thailand) power system increased by 5.23% from 2020 to 30,135 megawatts in 2021 as a result of high temperatures during the summer months and most companies implementing work from home policies.

## Petrochemicals

Business activities that utilize by-products to add value to the refinery production chain, including the production of aromatics and cleaning agents (Linear Alkyl Benzene).

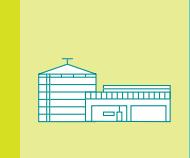
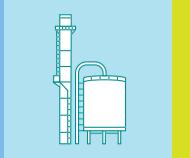
## Aromatics Market

The paraxylene market stabilized, while the new petrochemical plants in China contributed to a market surplus and increased the supply by 2.0 million tons per year during the latter half of the year. Meanwhile, as the COVID-19 pandemic situation improved in several countries, demand increased by 1.0 million tons per year.

The benzene market improved as supply decreased after the United States temporarily halted the production of 1.9 million tons of benzene during the winter storm in Texas, while the global economy started to recover.

## Linear Alkyl Benzene (LAB) Market

LAB prices increased due to the rise in feedstock prices, which caused by the increase in global oil prices after OPEC and its allies agreed to control crude oil production in response to global economic conditions. Furthermore, demand for LAB in Asia continued to grow as a result of population growth and advancements in the standard of living in developing countries.



In 2021, as a result of the COVID-19 pandemic easing in some countries and several governments introducing economic stimulus packages, the petroleum and petrochemical industry saw steady recovery. However, the outbreak of new variants during mid- and late-2021 restricted full recovery. These factors may eventually lead to a major transformation for oil producers across the world. As Thaioil operates a core business in oil refinery, with extended value chain activities in upstream and downstream businesses, the Company is continuously monitoring these changing market conditions and preparing measures to ensure that we are ready to manage these factors. (For more details, please see the "Market Review and Outlook" chapter in the Annual Report 2021 (Form 56-1 One Report) on p. 44.)

## Investment in Petrochemical Business

(Feasibility study in progress)

## Investment to Add Value to Heavy Naphtha

to improve the aromatics production plant to produce higher value products. (Feasibility study in progress)

## Investment in the Petrochemical Business through PT Chandra Asri Petrochemical Tbk (CAP)

to enter the market for petrochemical and high value products. (Completed)

## Expansion of Solvent and Chemical Products Business

in Southeast Asia. (Feasibility study in progress)

## Investing in business partners that distribute solvents and chemicals

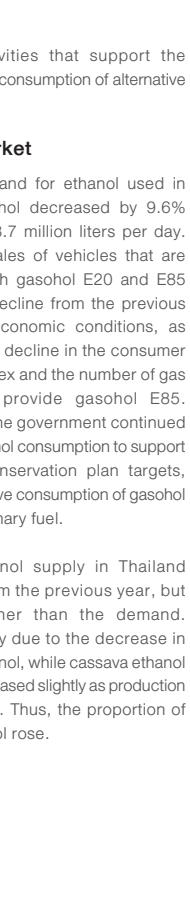
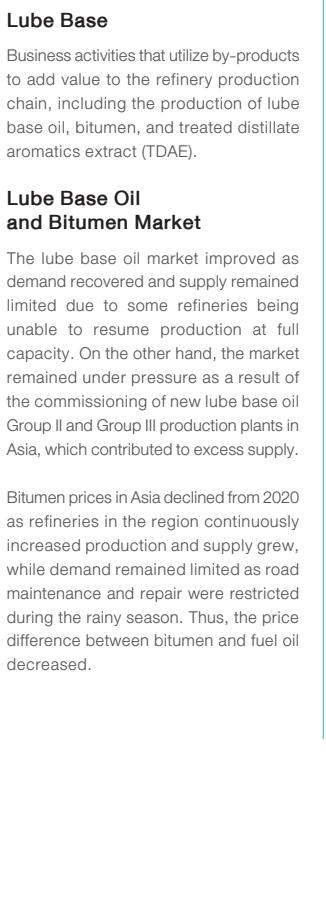
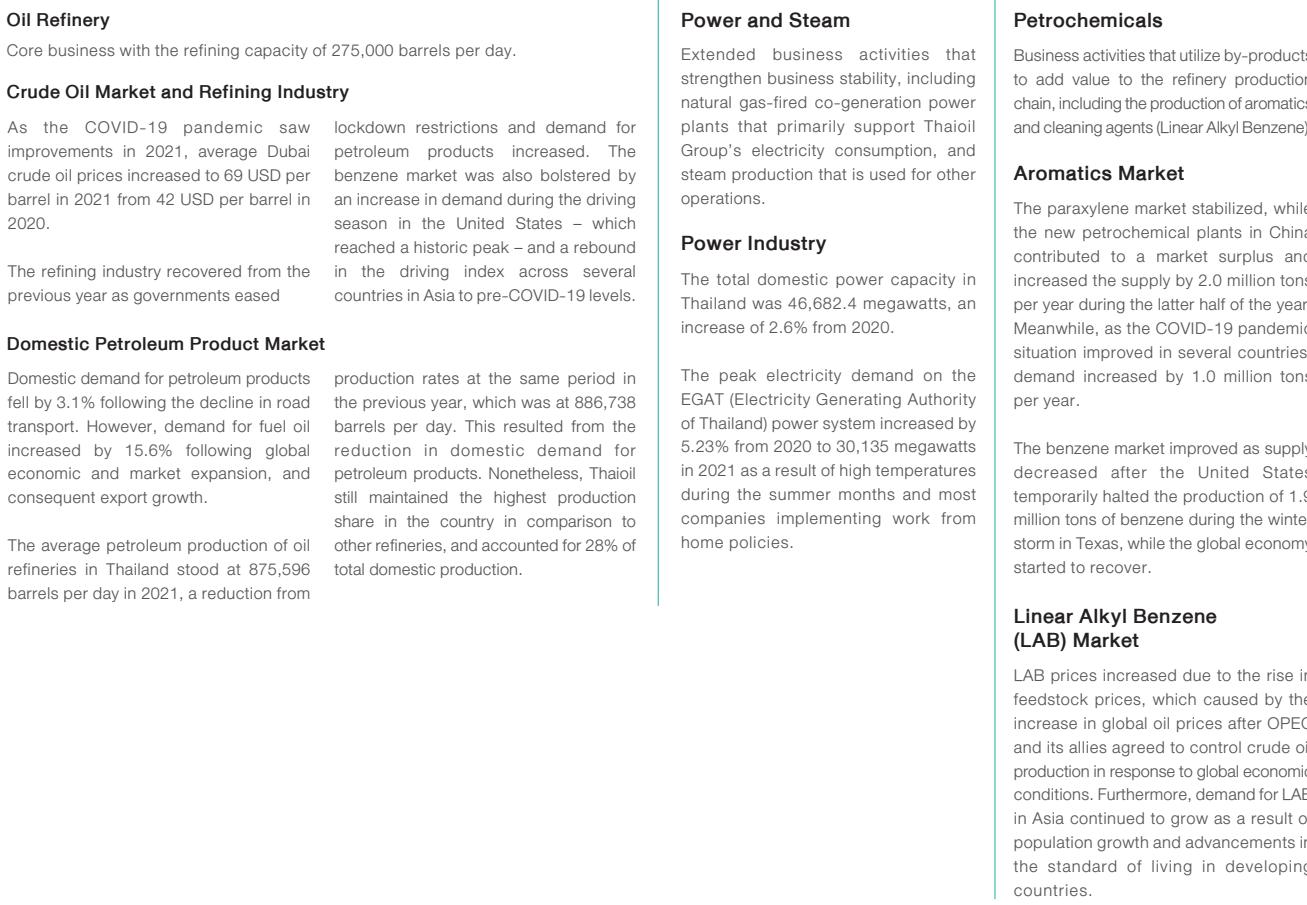
, namely: JSKem and TSChem India. (Completed)

## Study on Investments in New Businesses

that are environmentally friendly. (Feasibility study in progress)

## Investment in 2 start-ups, namely: Unabiz and Mineed Technology.

## Investment in Venture Capital Funds, including the Alibaba Fund.



## New Opportunities Business

Investments in corporate venture capital funds to capture business opportunities in new industries (step out business) and support new business expansion (new S-curve).



## Other supporting businesses

Businesses that support management, including:

- Recruitment
- Treasury Management
- Social Enterprise
- Digital and Communications
- Engineering Expertise

# BUSINESS MODEL

## The Macro Environment

The situation of the COVID-19 pandemic that continues from the previous year has dramatically changed lifestyles and energy demand patterns. Thaioil recognizes the importance of setting short- and long-term strategic directions that are ready to effectively manage the six capitals in order to ensure long-term sustainable growth and value creation for stakeholders. (See more details in the Thaioil Group's COVID-19 Control Measures and Business Strategy Outlook chapter on p.22-27)

### Capital/Inputs



The financial resources raised, consisting of debt and equity financing which are amounted to 123,094 and 239,050 million THB, respectively, is being strategically allocated by Thaioil to ensure organizational growth, and align with the strategic direction plan. In 2021, Thaioil's operating expenses were 319,555 million THB to support our business activities.



Thaioil's investment in the purchase, development and maintenance of infrastructure to maintain production efficiency. In 2021, Thaioil's Property, Plants & Equipment (PPE) was 178,399 million THB.



Thaioil understands natural resources are limited and irreplaceable, such as energy and water, play a critical role that supports our refining and business activities. In 2021, Thaioil's refinery throughput was 13.7 million tons; and total water and energy consumption were 22.1 million m<sup>3</sup> and 27.75 million GJ, respectively. In addition, 13 implemented energy improvement projects have enabled the organization to reduce our dependence on natural resources.



People are Thaioil's most valuable assets, our 1,799 employees are the pillar that supports organizational growth, and Thaioil has invested 506 million THB and 103,102 training hours in employee training and development.



To create an enabling environment for Thaioil's operations, we believe engaging with our financial and non-financial stakeholders are essential to grow and maintain trusted relationship sustainably. In 2021, Thaioil spent 216 million THB through community development programs and donations.

Thaioil's intellectual capital lies in our people. We not only focus on operational excellence, but we also focus on building innovative culture within the organizational knowledge management, and digital transformation projects. In addition, around 28 million THB were spent for research and development.

## 03 Operating & Process

Thaioil's operations are reinforced by the Operational Excellence principle, which has expanded to both upstream and downstream business activities, that allows the organization to contribute to long-term value creation. This is underpinned by a well-planned and fully integrated production process that yield optimum efficiency during a refining process through the conversion of petroleum by-products into high-value products (HVPs) for commercialization.

### Outputs

#### Products

Refined oil 275,000 barrels per day	LAB (Linear Alkyl Benzene) 134,000 tons	Emission and Wastes
Aromatics 727,000 tons	Ethanol (TET) 57.03 million liters	GHG Emission (Scopes 1 and 2) 3.15 million tons of CO <sub>2</sub> equivalent
Lubricants 243,000 tons	TDAE, TRAE & AROS 98,867 tons	Wastes 5,889 tons
Generated power 2,529 GWh	Green solvent 2,468 tons	Wastes to landfills 0 ton

## 02 Design & Development

Thaioil invests and utilizes the best-in-class technologies in the development of projects, such as in energy & process improvement and Clean Fuel Project (CFP) projects, which have significantly improved safety for our people, quality and efficiency of resource utilization for long-term value creation.

## 01 Sourcing

Thaioil uses an optimum crude procurement strategy to source crude oil for production. Crude oil is sourced from all over the world to reduce price fluctuations by considering cost price competitiveness in the open market. Furthermore, Thaioil's stringent ESG criteria on crude procurement practices prevent and mitigate crude suppliers' ESG risk, and are consistent with good governance, for example, prohibiting crude sourcing from sanctioned countries that may undermine transparency, stakeholder trust, and the company's business activities.

## 05 Usage & End of Use

Thaioil understands the scope of our products has adverse impacts to the environment and society. To reduce these impacts, a variety of green products has been incorporated in our product portfolio, such as bio-degradable solvent and low carbon fuel products, to ensure the end of our product life cycle enables to reduce the environmental and social impacts that benefit the current and future generations.

## 04 Oil & Chemical Distribution

Thaioil's produced fuels and chemicals are being distributed both domestically and internationally. Thaioil creates value in the distribution process through active customer engagement to ensure our product requirements meet our customers' expectations as well as market demand for shared value creation.

## Sustainable Value

Delivering on our purpose and contribution to the SDGs will be essential for long-term shared value creation together with our stakeholders and to Thaioil. (See more details in the SDGs Progress p.146-150)

### Outcomes To Thaioil

- + EBITDA 28,142 million THB
- + 64.62 million THB in cost savings from energy conservation projects
- + 190 million THB in cost savings from collaborating with partners for transferring crude oil through our single port mooring facility
- + No incident and penalty fees from non-compliance with laws and regulations, as well as case of corruptions and bribery
- + Revenue from low-carbon product sales increased by 29.9% or 137,260 million THB

### Outcomes To Stakeholders

- + Market Capitalization 110,937 million THB
- + Earnings 6.17 THB per share
- + Average daily closing stock price 54.38 THB per share, increased by 24%
- + Dividend payment 2.60 THB per share
- + Government tax payment at 2,034 million THB

### Stakeholder Impacts

- Message to Our Stakeholders (p.2-3)
- Group Overview (p.8-9)
- Thaioil Group's COVID-19 Control Measure and Business Strategy Outlook (p.22-27)
- Fight against Corruption (p.100-105)
- ESG Risk in Supply Chain Management (p.120-126)

### SDGs Impacted



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- Thaioil Group's COVID-19 Control Measure and Business Strategy Outlook (p.22-27)
- Circular Economy (p.56-67)



- Environmental Impact Management (p.38-46)
- Climate Change Risk (p.48-55)
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- Human Rights (p.70-75)
- Human and Organizational Development (p.82-87)
- Human Health and Safety (p.76-81)



- Customer Relations Management (p.118-119)
- Human Rights (p.70-75)
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- Human and Organizational Development (p.82-87)
- Innovation, Research and Development Management (p.112-117)
- Digital Transformation (p.106-111)



# STAKEHOLDERS AND MATERIAL MATTERS

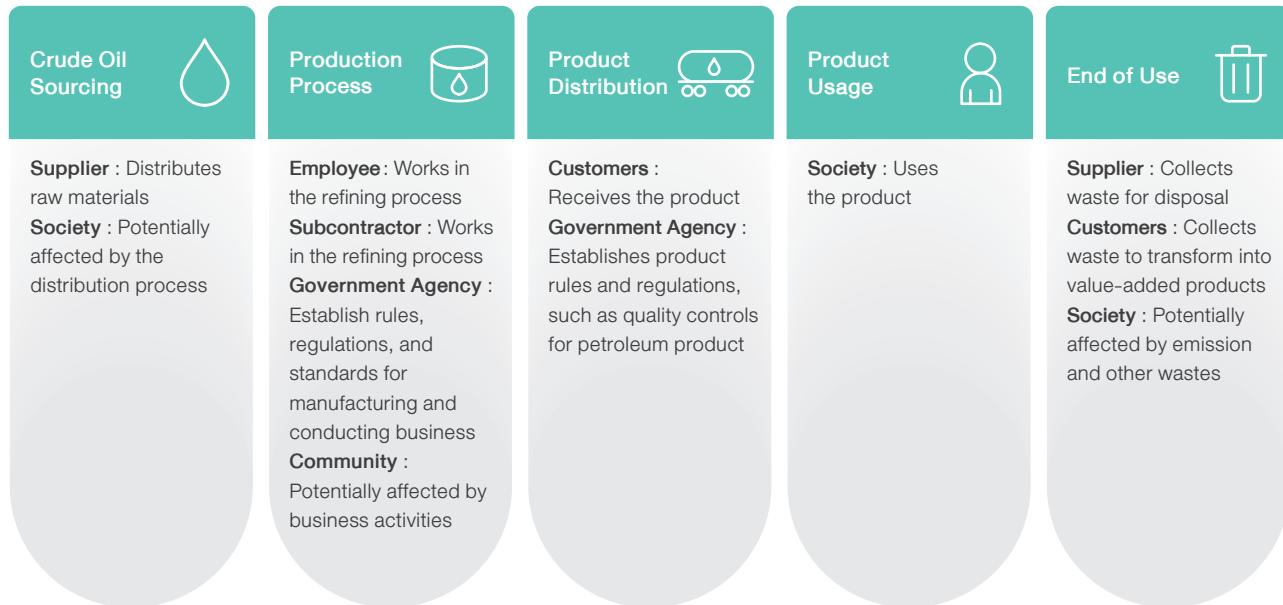


## Stakeholder Engagement

Maintaining good stakeholder relationships are vital in creating long term value for the businesses. To that end, Thaioil has established internal functions to ensure that we are in continuous communication with each of our stakeholder groups, and are aware of their viewpoints and expectations of the Company's business activities.

Thaioil has identified the stakeholder groups that are relevant to the organization through evaluating the relevance of each group across our value chain – from sourcing crude oil to the disposal of waste after product use. In identifying stakeholder groups, we also assess the impact and influence levels, as shown in the diagram below.

## Stakeholders along the Value Chain



Shareholders – Provides financial capital

Based on the value chain analysis, Thaioil grouped the identified stakeholders into six main groups, and developed appropriate engagement approaches for every stakeholder group accordingly. However, the COVID-19 pandemic has affected the method and frequency in communication, leading to increased reliance on online communications, as demonstrated in the table below.

Stakeholder Engagement Approach	
Stakeholders	Engagement Approach
 Shareholders/Creditors/ Financial Institutions	<ul style="list-style-type: none"> <li>• Annual General Meeting (AGM)</li> <li>• Annual / quarterly feedback survey and post-event engagement for feedback</li> <li>• Annual Report (Form 56-1 One Report) and Integrated Report</li> <li>• Quarterly meeting with analysts and rating agencies</li> <li>• Press release on business performance</li> <li>• Newsletters or online news</li> <li>• 20-30 Roadshow, Conference, and Company visit for investors (both domestic and foreign investors) per quarter</li> <li>• Participation in 7 events (Opportunity day and SET Digital roadshow) organized by the Stock Exchange of Thailand (SET) per year</li> <li>• TOP IR application</li> <li>• Grievance Mechanisms such as Hotline, Investor Relations Function, and Corporate Governance Function Email</li> </ul>
 Customers	<ul style="list-style-type: none"> <li>• Annual online customer engagement survey via questionnaire</li> <li>• Annual Report (Form 56-1 One Report) and Integrated Report</li> <li>• Meetings with customer representatives (Virtual meeting)</li> <li>• Weekly, monthly, and quarterly online news</li> <li>• Customer engagement during ceremonies and festivals</li> <li>• TOP Energy Application</li> <li>• Grievance Mechanisms such as Hotline, Customer Relations Function, and Corporate Governance Function Email</li> </ul>
 Suppliers/ Contractors	<ul style="list-style-type: none"> <li>• Annual Supplier Seminar and Webinar</li> <li>• Post-event engagement for feedback</li> <li>• Annual online supplier engagement survey via questionnaire</li> <li>• Annual Report (Form 56-1 One Report) and Integrated Report</li> <li>• Activities promoting workplace safety, such as evaluating performance and providing awards for outstanding supplier performance</li> <li>• Supplier and contractor meetings in accordance with the procurement process</li> <li>• Email communications as appropriate such as communicating with suppliers regarding COVID-19 measures</li> <li>• Grievance Mechanisms such as Hotline, Supplier Relations Function, and Corporate Governance Function Email</li> </ul>

Stakeholders	Engagement Approach
 Employees	<ul style="list-style-type: none"> <li>Annual Labour Union Meeting</li> <li>Annual Online Employee Engagement Survey</li> <li>Annual Report (Form 56-1 One Report) and Integrated Report</li> <li>“CEO Connect” Forum (Live) Quarterly</li> <li>Joint meetings between management and employee representatives, such as the welfare committee and the employee committee</li> <li>The “Akanee” monthly magazine</li> <li>Monthly and weekly newsletters or online news</li> <li>Employee visits conducted by People Management function according to measures of I-COVID center</li> <li>Communicating through digital platforms and notice board</li> <li>Applications to access welfare benefits and other activities, such as “Jam Saab”</li> <li>Grievance Mechanisms such as Hotline, Employee Relations Function, and Corporate Governance Function Email</li> </ul>
 Community/ Society	<ul style="list-style-type: none"> <li>Annual Community Engagement Survey via questionnaire and Opinion Survey on various activities</li> <li>Annual Report (Form 56-1 One Report) and Integrated Report</li> <li>Communicate via “Thaioil Journal for the community” every 2 months</li> <li>Monthly meetings with community leaders and monthly tripartite meetings between Thaioil, government agencies, and communities</li> <li>Monthly events with small Thaioil teams and communities</li> <li>Visiting communities onsite with project partners</li> <li>Community development projects, such as school activities and community activities</li> <li>Communicating through social media and digital platforms</li> <li>Grievance Mechanisms such as Hotline, Community Relations Function, Thaioil Group Community Health and Learning Center, and Corporate Governance Function Email</li> </ul>
 Government and Related Public Agencies	<ul style="list-style-type: none"> <li>Annual feedback survey via questionnaire</li> <li>Annual Report (Form 56-1 One Report) and Integrated Report</li> <li>Meetings with representative from government and relevant public agencies</li> <li>Monthly tripartite meetings between Thaioil, government agencies, and communities</li> <li>Grievance Mechanisms such as Government Affairs Function and Corporate Governance Function Email</li> </ul>

Remark: During the COVID-19 pandemic, some events were either held off or cancelled.

## Thaioil Group's Materiality Assessment Process

Thaioil assessed significant sustainability issues and its materiality to our stakeholders and business in accordance with the Global Reporting Initiative (GRI) Standards. In this process, we also adapted the value creation concept in managing material matters, which aligned with the Value Reporting Foundation Framework. The process presented in this Report has also been externally verified.

## Thaioil Group's Materiality Assessment Process



In 2021, Thaioil adjusted the materiality assessment timeline such that the assessment took place at the start of the year. Outcomes of the materiality assessment were then used to inform the development of the organization's sustainability strategy in the Strategic Thinking Session. This supported the company in planning, setting targets, and managing the six capitals – namely, financial capital, manufactured capital, natural capital, human capital, intellectual capital, and social and relationship capital.

### Step 1: Identification of material matters

Thaioil identified material sustainability issues in 2021 through analysing both internal and external drivers. Internal drivers reflect results of our SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis, our short-term, medium-term, and long-term business strategic directions, and our corporate risk profile. External drivers reflect issues of interest communicated by the Dow Jones Sustainability Indices (DJSI), the material issues identified by other oil refining companies, the United Nations' Sustainable Development Goals (UN SDGs), and national and global trends as identified by reputable organizations, such as the World Economic Forum (WEF). Upon compiling these internal and external drivers, we then reviewed the information to determine if there were any additional material issues that should be added in comparison to the previous year.

### Step 2: Prioritization of material matters

Thaioil prioritized the material sustainability issues identified in 2021 through reviewing the prioritization results of the previous year while considering the external drivers that may affect the business and the organization's stakeholders. We also considered the impacts from business direction in different areas of the business. All material issues were grouped into high, medium, and low levels of importance based on a 1-7 point scoring criteria. Each material matter was then prioritized based on two dimensions, including:

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

### Step 3: Validation of material matters

The Sustainable Development function was the first line to review the results of the prioritized material issues to ensure completeness. The results were then presented to the Sustainable Development Committee in a meeting chaired by the President and CEO for a final review and endorsement of prioritized material issues within the scope of both internal and external impacts. Finally, Thaioil grouped together material issues that were similar, and consolidated the 30 issues into 17 main topics.

Additionally, an external independent verifier was invited to ensure that the materiality assessment process, stakeholder engagement process, and the collection and compilation of data related to our safety and environmental performance have all been done with accuracy, clarity, and completeness. The assurance statement is presented on pages 140-141

## Results of 2021 Materiality Assessment

The 2021 materiality assessment found that changing external contexts have affected stakeholders' expectations. They have positively and negatively impacted to stakeholders and Thaioil's ability to create long-term value. For example, intensifying changes in climate law and coping with the situation of the COVID-19 pandemic have affected the lifestyle of society and communities around Thaioil's refinery, as well as changes in the laws, rules, and regulations of the world becomes more increasingly stringent, along with the increased emphasis on the importance of environmentally-friendly products in respective to changes in consumer behaviour.

## Thaioil Group Materiality Matrix 2021



Sustainability Context	Risks, Opportunities, and Impacts on Business	Expectations and Viewpoints Expressed by Stakeholder Group Representatives	Related Material Sustainability Topic	Sustainability Strategies to manage material topics			Details of Management Approach
				Enhance Environment	Engage Society	Ensure Good Governance and Economic Resilience	
COVID-19 Pandemic	<ul style="list-style-type: none"> <li>Oil production volume has declined as domestic and international demand for oil have been disrupted.</li> </ul>	<ul style="list-style-type: none"> <li>Shareholders/creditors/financial institutions expect Thaioil to build financial stability by finding more secure revenue streams.</li> </ul>	 Business Diversification				Thaioil Group's COVID-19 Control Measures and Business Strategy Outlook (Page 22-27)
	<ul style="list-style-type: none"> <li>Infection risks in the area of operations could lead to operational disruption for at least 14 days.</li> </ul>	<ul style="list-style-type: none"> <li>The government and related public agencies expect Thaioil to have adequate COVID-19 control measures.</li> </ul>					
		<ul style="list-style-type: none"> <li>Different stakeholder groups expect that Thaioil will provide appropriate response to the crisis and associated risks. This includes providing a decent working environment that allows all relevant personnel to maintain good health while working.</li> </ul>	 Human Health and Safety				Human Health and Safety (Page 76-81)
			 Digital Transformation				Digital Transformation (Page 106-111)
			 Human Rights				Human Rights (Page 70-75)
Climate Change	<ul style="list-style-type: none"> <li>Handling the situation of COVID-19 pandemic, which has affected the changing lifestyle of society and communities surrounding Thaioil refinery.</li> </ul>	<ul style="list-style-type: none"> <li>Thaioil is expected to support projects aimed at improving the quality of life in the communities surrounding the refinery during and after the COVID-19 situation.</li> </ul>	 Corporate Social Responsibility				Corporate Social Responsibility (Page 88-97)
	<ul style="list-style-type: none"> <li>COVID-19 pandemic poses a risk to the secure delivery of products to customers.</li> </ul>	<ul style="list-style-type: none"> <li>Customers expect Thaioil to set a measure of receiving products which they are able to safe from COVID-19, along with good after-sales services.</li> </ul>					
	<ul style="list-style-type: none"> <li>Intensified climate change policies, such as setting a long-term target of net zero emissions to align with government commitments in Paris Agreement, may result in additional costs for businesses if they do not comply with new laws and regulations.</li> </ul>	<ul style="list-style-type: none"> <li>Shareholders/creditors/financial institutions expect Thaioil to report the approach on business operations more environmentally friendly which support global measures to reduce greenhouse gas emission.</li> </ul>	 Climate Change				Climate Change Risk (Page 48-55)

Sustainability Context	Risks, Opportunities, and Impacts on Business	Expectations and Viewpoints Expressed by Stakeholder Group Representatives	Related Material Sustainability Topic	Sustainability Strategies to manage material topics	Details of Management Approach
	<ul style="list-style-type: none"> <li>Technological changes driving towards the use of alternative energy in replacement of oil as an energy source will impact the energy industry. The enforcement of various regulations would promote alternative energy usage instead of oil may also impact long term revenue and business growth.</li> <li>Investment opportunities in new businesses that reduce the impacts on climate change.</li> <li>Impacts of physical risks from climate change on water resources.</li> </ul>	<ul style="list-style-type: none"> <li>The government and related public agencies expect that Thaioil will invest in environmental projects, such as environmentally friendly fuels and renewable energy, to support the achievement of Thailand's national greenhouse gas emission reduction targets.</li> <li>Communities expect that Thaioil's corporate social responsibility strategy will include renewable energy projects.</li> </ul>	 <b>Environmental Management</b>	<ul style="list-style-type: none"> <li>Enhance Environment</li> <li>Engage Society</li> <li>Ensure Good Governance and Economic Resilience</li> </ul>	Environmental Impact Management (Page 38-46)
<b>Operational Eco-Efficiency</b>	<ul style="list-style-type: none"> <li>The movement towards circular economy principles is driven by Thai and foreign governments, as seen in recent initiatives to increase recycling and the ban on single-use plastic.</li> <li>Social and consumer trends that move towards the circular economy create expectations on businesses to reduce environmental impacts throughout the product life cycle, which may create impacts on reputation, revenues, and long-term business growth.</li> <li>The opportunity to adapt business operations to be more in line with circular economy principles reduce production costs and maximizes efficiency in extracting and consuming of limited resources.</li> </ul>	<ul style="list-style-type: none"> <li>Shareholders/creditors/financial institutions expect Thaioil to continuously increase energy efficiency and set its challenging goal.</li> <li>Suppliers/contractors expect Thaioil to support supplier environmental, social, and governance performance, in line with Thaioil's policies.</li> <li>The government and related public agencies expect Thaioil to manage energy efficiency to support the country in achieving national greenhouse gas reduction targets. They also expect that Thaioil will reduce impacts on air quality, which could lead to other business opportunities to further reduce the impacts, such as the Euro 5 fuel products.</li> <li>Communities expect that Thaioil will promote the attainment of knowledge related to energy in order to support sustainable standard of living.</li> </ul>	 <b>Circular Economy</b>	<ul style="list-style-type: none"> <li>Enhance Environment</li> <li>Engage Society</li> <li>Ensure Good Governance and Economic Resilience</li> </ul>	Circular Economy (Page 56-67)
			 <b>Sustainable Procurement</b>	<ul style="list-style-type: none"> <li>Enhance Environment</li> <li>Engage Society</li> <li>Ensure Good Governance and Economic Resilience</li> </ul>	ESG Risk in Supply Chain Management (Page 120-126)
<b>Demographic Changes</b>	<ul style="list-style-type: none"> <li>Global aging population trends are especially relevant in Thailand, a country with one of the most rapidly aging populations in the world, and associated potential business impacts are unable to manage retirement, especially for businesses such as Thaioil that is seeking to expand.</li> </ul>	<ul style="list-style-type: none"> <li>Shareholders/creditors/financial institutions, customers, suppliers/contractors, and communities expect that Thaioil's employees will have the capacity to adequately respond to stakeholders' expectations.</li> </ul>	 <b>Corporate Social Responsibility</b>	<ul style="list-style-type: none"> <li>Enhance Environment</li> <li>Engage Society</li> <li>Ensure Good Governance and Economic Resilience</li> </ul>	Corporate Social Responsibility (Page 88-97)
			 <b>Talent Attraction and Retention</b>	<ul style="list-style-type: none"> <li>Enhance Environment</li> <li>Engage Society</li> <li>Ensure Good Governance and Economic Resilience</li> </ul>	Human and Organization Development (Page 82-87)

Sustainability Context	Risks, Opportunities, and Impacts on Business	Expectations and Viewpoints Expressed by Stakeholder Group Representatives	Related Material Sustainability Topic	Sustainability Strategies to manage material topics			Details of Management Approach
				Enhance Environment	Engage Society	Ensure Good Governance and Economic Resilience	
	<ul style="list-style-type: none"> <li>The new generation's (Millennials and Gen Z) behaviour and expectations of the workplace, and the differences of such behaviour and expectations from existing workplace practices, may lead to challenges in recruitment and eventual labour shortage without adaptation to attract this demographic. This is especially relevant in the context of business expansion</li> </ul>	<ul style="list-style-type: none"> <li>Employees expect that Thaioil will develop employee's capabilities to support business expansion, and provide a working environment that is fitting to their needs.</li> </ul>					
<b>Innovation and Digitalization</b>	<ul style="list-style-type: none"> <li>Risks in transitioning to the digital age in the oil refinery business, especially with regards to ensuring that there is enough workforce and talent to support this digital transformation, may affect the company competitiveness.</li> <li>Opportunities to increase operational efficiency through the use of technology.</li> <li>Opportunities to invest in new technologies that create long term revenue growth.</li> <li>Risks from cyber threats and data theft.</li> <li>Strengthened personal data protection and increased cyberattacks.</li> </ul>	<ul style="list-style-type: none"> <li>Shareholders/creditors/financial institutions expect Thaioil to report the approach on business adaptation and use of innovation in order to confront future challenges, especially the risks from changes in the oil and gas industry</li> <li>Customers expect Thaioil to maintain product quality, especially in the context of business expansion with the CFP Project, and use innovation to meet customer demands and customer satisfaction.</li> <li>Employees expect Thaioil to be an agile organization that is able to improve operations and adapt to the changing business context in a timely manner, and improve human resource management.</li> </ul>	 <b>Human and Organization Development</b>	 <b>Business Disruption and Innovation</b>	 <b>Digital Transformation</b>	 <b>Corporate Governance</b>	 <b>Fight Against Corruption</b>
<b>ESG Reporting</b>	<ul style="list-style-type: none"> <li>Increased awareness of responsible investment that considers environmental, social and good governance aspects amongst investors of various institutions in both the global and national levels, as evidenced by the development of the Thailand Sustainability Investment (THSI) and the Negative List Guideline of domestic and international financial institutions, may impact on business in terms of reputation and revenue if management of such issues are inadequate</li> </ul>	<ul style="list-style-type: none"> <li>Suppliers/contractors expect Thaioil to treat all suppliers equally, with fairness, and without bias.</li> <li>The government and related public agencies expect Thaioil to continue to strengthen measures to fight against corruption.</li> </ul>					

# THAIOIL GROUP'S COVID-19 CONTROL MEASURES AND BUSINESS STRATEGY OUTLOOK



Thaioil Group's vision is to



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

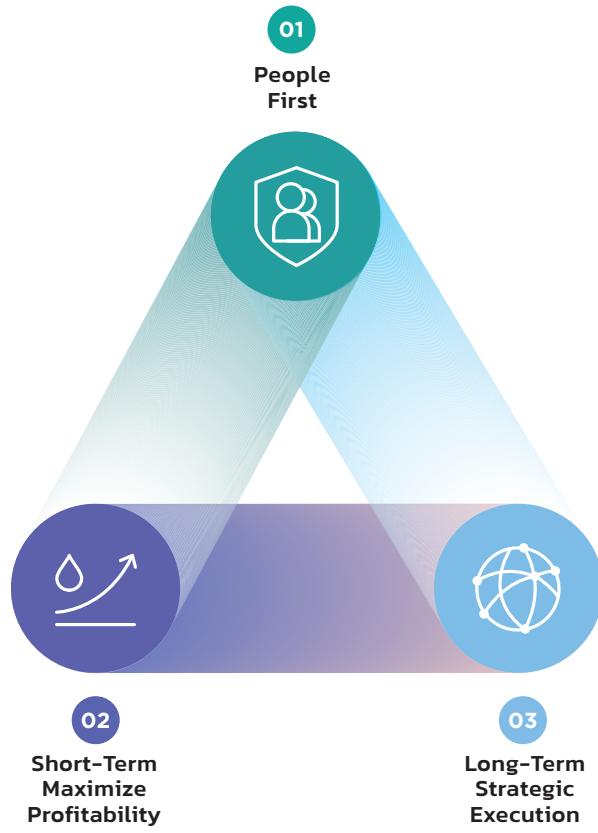


**This means our goal is to become a high competitive energy and chemicals company that will generate sustainable returns to all our stakeholders, increase their quality of life, and drive sustainable growth within the organization, all while maintaining the balance across the economic, social, environmental, and governance dimensions.**

Since 2020, the Company observed high rates of volatility and recurring economic and political instability across our country, region, and the world – including the COVID-19 pandemic crisis. This brought about large, abrupt changes in how business is conducted and how we live our lives, and further reiterated to Thaioil Group the importance of increasing the resilience of our strategic plan in order to adapt to the changes and trends of this unpredictable context. Henceforth, the Company has revisited the strategic direction and plan, including the short-term, medium-term, and long-term business plans – altogether spanning the years 2022-2030 – and reformulated it into three main business directions and strategies. In this process, we have considered global megatrends, analyzed competitor movements, and studied

the 'new normal' context and associated changes in society and consumer behavior, to make certain that Thaioil has the appropriate business direction and strategic plan in accomplishing our goals that can truly grow our business towards sustainable business growth.

During the COVID-19 pandemic, Thaioil Group has implemented measures to ensure business excellence and these measures are based on three key principles or three-pronged strategy, as presented below:



01

**People First:**

The Company ensures the safety of employees and subcontractors working on Company premises at all times and supports employees in adapting to work under “new normal” working conditions. Since we launched the I-COVID Center in 2020, the Center has played a key role in leading our organization in navigating the COVID-19 pandemic, establishing infection control measures, and ensuring the effective implementation of these measures, which align with the 3Ps – Promote, Protect, and Preserve – and the 3Cs – Clustering, Control, and Conformity (see more details in the Human Rights chapter on pages 70-75). Different safety measures have been established for each employee group to optimize organizational efficiency. For example, shift workers in the refinery can refer to the bubble and seal (Safe House and Cluster), engineers are organized into clusters of operators according to group activities, and day workers follow the work from home policy. We maintain regular communication with employees and stakeholders and provide them with important news and updates through an application. Additionally, we have procured vaccines for our employees and subcontractors, ensuring that both are double vaccinated and also finding booster shots for employees.

02

**Short-Term Maximize Profitability:**

The Company drives new ways to maintain competitiveness, maximize profits and minimize costs through business operation in three areas:

**Integrated management for operational excellence and sustainability**

Through operating all activities across the value chain with efficiency and flexibility, the Company was able to maintain an integrated intake reduction rate at 10-20% by adjusting production processes to fit with market conditions at the time for profit maximisation, and the type and volume of crude oil purchases that were suitable for the production capacity. For example, we reduced production of aviation fuels and instead increased production of products that were in higher demand and high value – such as benzene fuel products, diesel fuel products, aromatics, and cleaning agents (LAB). Excellence in operational management has helped Thaioil maintain operation availability at 100 and maintain stellar safety performance, with our total recordable case frequency rate (TRCF) ranking top ten within the top quartile of the global oil and gas benchmarking by Oil and Gas UK Benchmarking.

**Commercial Excellence**

The Company uses a proactive marketing strategy to maximize sales performance. This strategy entails expanding our existing customer base in Thailand and abroad, increasing the sales volume of Thaioil Group products in target countries with high economic growth rates, increasing the proportion of direct sales to end users and sales of high value products, as well as identifying the type and volume of crude oil and feedstock that will allow for flexible procurement. Through the implementation of this strategy, the Company achieved 94% customer engagement and succeeded in establishing a joint venture with a business partner that sells solvents and chemicals in India and Singapore.

**Financial Management**

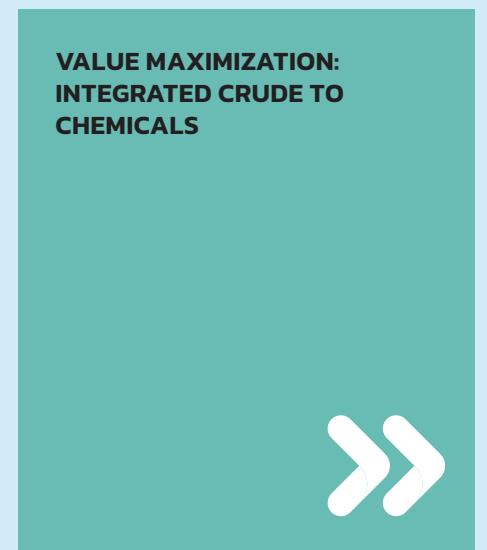
The Company manages costs through various measures, including setting challenging targets and communicating, monitoring, and reporting performance regularly. The Company promotes an organizational culture that encourages employees to be involved and share their thoughts and ideas in reducing costs. Through these measures, the Company was able to achieve cost reduction and exceed our targets.

03

**Long-Term Strategic Execution for Long-Term:**

The Company uses the 3Vs business strategy to ensure that the Company will achieve the targets set in our strategic plan and align with our vision.

## Three Main Business Strategies and Directions (3Vs)



### VALUE MAXIMIZATION: INTEGRATED CRUDE TO CHEMICALS

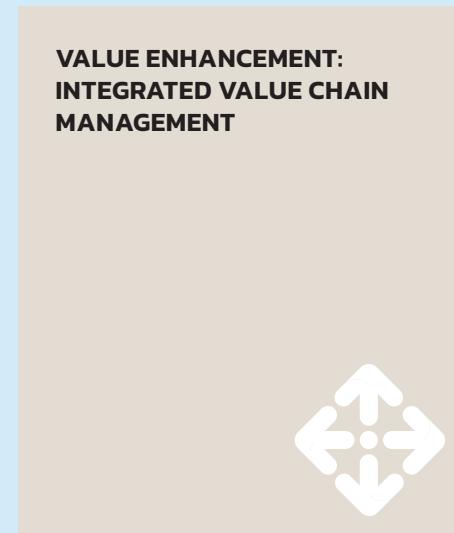
The Value Maximization: Integrated Crude to Chemicals strategy involves the integration of the value chains of the current businesses with future businesses, and the search for additional investment opportunities in the petrochemicals and high value products businesses. Thaioil will optimize the use of current production facilities to maximize product value, strengthen our competitive advantage, and increase business resilience. Details are presented below.

**Refinery:** The refinery business will act as an important production base that supports business resilience, while the Clean Fuel Project (CFP) investment builds our competitive advantage in the long term. Thaioil's refinery will support Thailand's national energy security, especially during the energy transition as the sector moves from traditional energy sources to newer energy sources, and serve as a production base for raw materials used in the production of petrochemical products.

**Aromatics:** The aromatics business will add value to the products of the refinery and satisfy regional demand for aromatics while achieving appropriate production costs.

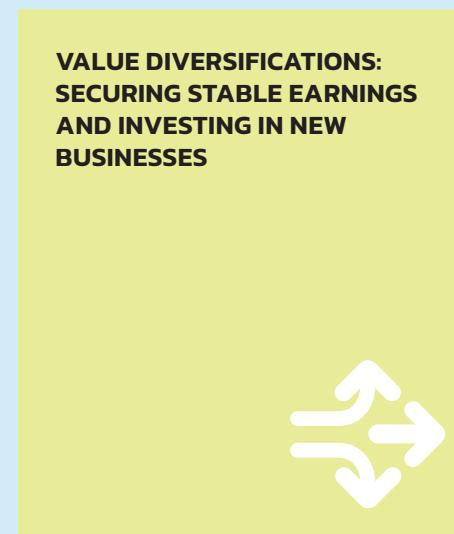
**Olefins:** The olefins business will add value to the products of the refinery through investing in joint ventures in Indonesia and pioneering the regional market with business partners.

**High Value Product (HVP):** HVP business will seek high value products alongside business partners and clients, and adapt to meet the needs of market volatility expected in the future. To that end, the business will invest in product development through adjusting production processes and investing alongside our partners.



### VALUE ENHANCEMENT: INTEGRATED VALUE CHAIN MANAGEMENT

The Value Enhancement: Integrated Value Chain Management strategy guides the integration of Thaioil Group businesses and value chain management to sustainably build competitive advantage for the business. We will utilize business investment platforms and work with partners to develop and distribute products to meet market demand, directing our focus towards markets in the region with high demand, while also seeking investment opportunities within the region.



### VALUE DIVERSIFICATIONS: SECURING STABLE EARNINGS AND INVESTING IN NEW BUSINESSES

The Value Diversifications: Securing Stable Earnings and Investing in New Businesses strategy entails diversifying our investment portfolio to build earnings stability. To increase the resilience of our investment portfolio, we will seek opportunities to invest in new businesses that align with future trends. Details are presented below.

**Stable Earnings: Power Business** We will uphold power security and generate stable incomes for the Company through investing in the power business, focusing especially on generating power from renewable energy sources.

**New Businesses (New S-Curve):** We will increase the resilience of our investment portfolio and align with industry trends and future changes in energy consumption through making corporate venture capital (CVC) investments, investing in new businesses like "Step Out Business", and driving the commercialization of innovation initiatives.

### Year 2022 Short-term action plan

- Build competitive advantage in our core business - the refinery - through the Clean Fuel Project (CFP) and the Euro 5 Fuel Production Project, while ensuring the implementation of both projects are implemented as planned.
- Build upon investments in the petrochemicals business in Indonesia.
- Study opportunities to invest in the aromatics and olefins businesses, chemicals businesses, and developing high value products.

### Year 2023-2026 Medium-term action plan

Seek opportunities to invest in pathways to leverage the petroleum business to achieve outcomes in the petrochemicals and high value product businesses. Explore additional pathways to add value to the petrochemicals business value chain to respond to client and market demands in the future. Refer to the example of PT Chandra Asri Petrochemical Tbk (CAP) efforts in expanding production capacity in the petrochemicals business, which Thaioil is one of the shareholders.

### Year 2027-2030 Long-term action plan

- Build competitive advantage, specifically regarding production costs and profitability, to achieve top quartile performance.
- By 2030, targeting to make 40% of net profit generated from the petroleum business, and 40% of net profit generated from the petrochemicals business, and also targeting to 20% of net revenue generated from the high value products business. This will mitigate the risks of volatility in the refinery and petrochemicals businesses.

- Expand the business to other geographies, specifically Thailand and targeting countries in the Indochina region - i.e., Cambodia, Lao, Myanmar, and Vietnam - as well as Indonesia and India, which have high economic growth rates.
- Expand the product portfolio while increasing the share of high value product sales.
- Expand the customer portfolio while increasing the share of direct sales to consumers.
- Expand the crude oil portfolio. Prioritize raw material procurement that is reliable and offers competitive prices. Maintain flexibility in procurement in order to adjust the type and quantity of the crude oil and other raw materials procured to respond to highly volatile market conditions.
- Leverage the organization's physical and digital platforms to manage the value chain and achieve value optimization. The platform supports market analysis, planning and production, as well as sales and product delivery. It provides timely updates of market data and integrates data management across the organization, thus enabling efficient work processes and organizational flexibility.

Expand the customer base to target countries and leverage existing platforms, workforce, and customer base within Thailand and abroad to seek new opportunities. Increase market share in target countries through partnerships, joint ventures, and mergers and acquisitions.

Act as a center for product and service distribution and delivery for Thaioil Group. Strengthen the reliability of transportation services and public utilities. Seek joint venture partners, as well as opportunities for mergers and acquisitions, while prioritizing businesses that will find synergy with Thaioil, add value, and contribute to strengthening the Company's value chain. This will support Thaioil in sustainably progressing towards becoming a business leader. By 2030, increase the share of revenue from products and businesses abroad to at least 30% of total revenue.

- Expand power and steam production capacity of TOP SPP Company Limited to replace the power plant of Thaioil Power Plant Company Limited. This will strengthen Thaioil Group's energy security and support electricity and steam consumption of the Thaioil Group within the Sriracha Refinery area.
- Strengthen the Company's energy security and build earnings stability through driving growth in Global Power Synergy Company (GPSC), PTT Group's flagship power company, as a shareholder.
- Study new businesses that align with market growth and demand forecasts and seek opportunities to invest in these businesses through corporate venture capital, joint ventures, or mergers and acquisitions.

Support energy production for Thaioil Group consumption. Seek opportunities to invest in growing the power business through investing in joint ventures and mergers and acquisitions, prioritizing renewable energy options in target countries within the region.

Seek opportunities to invest in the power business and in new businesses that align with industry trends and forecasted changes in energy consumption, including businesses that support the Company's net zero greenhouse gas emission commitment. By 2030, the share of power business is 10% of net profits, while new businesses are 10% of net profit.

## Success Enabler Plan:



In order to achieve the set targets and align with the corporate vision, mission, and strategic direction, the Company operates efficiently through following the 4Ps principles for effective execution:

### People:

Build employee capacity to drive business development to secure future growth. Recruit the right people. Manage the organization as a matrix organization. Deploy employees to work at joint ventures abroad, aligning with the Company's strategic direction and targets. Maintain workforce productivity at the 75th percentile in comparison to industry peers.

### Patronage:

Deliver value to customers, business partners, investors, shareholders, government, and communities in order to remain responsive to their demands and co-create to identify existing business extension opportunities.

### Platform:

Utilize different platforms to optimize value. As of present, Thaioil has a variety of platforms including the business platform, knowledge platform, and digital platform. Together, these platforms support business expansion. The Company has developed a masterplan for the digital platform for value chain management. This platform supports market analysis, planning and production, as well as sales and product delivery. It provides timely updates of market data and integrates data management across the organization, thus enabling efficient work processes and organizational flexibility.

### Partner:

Build business partnerships in Thailand and abroad for collaborative product and business development.

## Strategic Plan for Sustainability Management

To uphold the organization's vision to "Empowering Human Life through Sustainable Energy and Chemicals" with a sustainability goal of becoming a 100-year organization and a global leader in sustainability through environment, society, and governance (ESG) management that preserves good relationships with all of our stakeholder groups.

In 2021, the Company reviewed and updated the corporate strategic plan for sustainability management to ensure that the plan still aligns with our corporate vision; reflects current external factors and national and global policy trends; and will guide us in managing ESG risks, building competitive advantage, and creating value for stakeholders throughout the value chain. The updated strategic plan for sustainability strategy and ESG management is presented as follows:

Sustainability Dimension	Strategy	Success Indicators
	<p><b>Enhance Environment:</b> Enhancing environmental management to ensure the alignment with global directions.</p> <ul style="list-style-type: none"> <li>Explore pathways to achieve net zero Greenhouse Gas (GHG) emissions by 2060.</li> <li>Increase the share of revenue from environmentally friendly businesses and products, in effect helping end users reduce greenhouse gas emissions associated with product use.</li> </ul>	<p><b>Top Quartile Performance:</b> Achieve net zero GHG emissions by 2060 through applying decarbonization technology that reduces emissions released during the production process; removes any remaining emissions still released in production through carbon removal; and seeks investment opportunities in businesses that will support the net zero emissions target.</p> <p><b>Product or Service with Positive Impact:</b> Maintain the proportion of revenue generated from environmentally friendly businesses and products at least 25% of all sales revenue by 2030.</p>
	<p><b>Engage Society:</b> Engaging with community and society for long-term social value creation.</p> <ul style="list-style-type: none"> <li>CSR for the Community: Develop public utilities, improve public health capacity, create green spaces – including a “Thaioil Eco Park” in honor of Thaioil’s 60-year anniversary – and promote employment in communities.</li> <li>CSR for the Society: Invest in public health and medical centers through increasing energy efficiency (EE), piloting prototype for renewable energy (RE) systems, and installing solar cell systems, and continuing to develop public utilities infrastructure in conjunction with the development of medical innovations in areas that align with the Company’s future business projects.</li> <li>Nature-based Solutions: Invest in promoting the conservation, rehabilitation, and expansion of forests and wetlands, and in creating a balanced ecosystem in the local community. This strategy will also support the Company towards achieving the net zero emissions target in the long term.</li> </ul>	<p><b>Positive Impact from Social Investment:</b></p> <ul style="list-style-type: none"> <li>Achieve a social return on investment (SROI) of at least 2:1 by 2030.</li> <li>Support the organizational net zero emissions target through conserving, rehabilitating, and expanding forests and mangrove forests, and through creating a balanced ecosystem in the local community that could support carbon capture and storage.</li> </ul> <p><b>Positive Impact from Community Investment:</b></p> <ul style="list-style-type: none"> <li>Conduct engagement surveys with surrounding communities, while maintaining the target of more than 90% of community engagement score</li> </ul>
	<p><b>Ensure Good Governance and Economic Resilience:</b> Ensuring trust in good corporate governance and transparency within the organization in order to strengthen the business and move towards sustainability through applying governance, risk, and compliance (GRC) principles alongside three key fundamentals:</p> <ol style="list-style-type: none"> <li>1. Tone from the top</li> <li>2. Strengthen from the inside</li> <li>3. Balance control and efficiency</li> </ol> <p>These principles, alongside the implementation of GRC processes, serve to establish a strong foundation within the organization to ensure an effective corporate governance system.</p>	<p><b>Zero Case of Non-Compliance and Fraud Incidents</b></p>

# CORPORATE GOVERNANCE AND SUSTAINABILITY



As of 31st December 2021, the Board of Directors of Thaioil Group had 15 members, including:



1 executive director



14 non-executive directors, including

6 non-executive and non-independent directors, of which 1 is female



8 non-executive and independent directors, of which 0 is female



The average director tenure was  
**2.56** years

\*Average data covers 1<sup>st</sup> January – 31<sup>st</sup> December 2021



The average board meeting attendance was **99.6%**

## Board Structure

Section 5 of the Corporate Governance Manual of Thai Oil Public Company (Limited) states that the Board must consist of not fewer than five nor more than 15 members, with at least half of the Board members being permanent residents of Thailand. Board directors may hold the Company shares if they choose to, but it is not required. Directors are appointed to the Board by shareholder selection during the Annual General Shareholders' Meeting, unless in cases where a vacancy results from a reason other than completion of the member's term, in which there may be direct appointment by the Board. At least one third of the total number of directors, but not less than three, should be independent directors. As of present, the number of independent directors in the Company's Board is higher than legal requirements.

In order to ensure that directors can adequately dedicate their time to fulfil their roles and deliver the best interest for Thaioil, the Company requires that all members of the Board have no more than three directorships in companies listed in the Stock Exchange of Thailand. This number includes the directorship for Thaioil. (See more details in the Annual Report 2021 (Form 56-1 One Report), under the "Board of Directors" chapter on page 114)

In line with good corporate governance practices, performance of the Board is evaluated on an annual basis. The evaluation consists of two parts, including: 1) evaluation of the Board and the Board committees, and 2) self-evaluation and evaluation of other directors. Thaioil also has a policy to conduct an independent, third party Board evaluation every three years, in order to gain feedback and recommendations to further improve Board performance. (See more details in the Annual Report 2021 (Form 56-1 One Report), under the "Corporate Governance Policy" chapter on page 93)

**Thaioil has developed a board skill matrix to drive Board diversity in skills, expertise, and backgrounds across different fields, including:**

	
Energy/ Petroleum/ Petrochemicals	Political Science/Social Science
	
Engineering	Security
	
Accounting and Finance	Information and Digital Technology
	
Law	Business Management/ Organizational Management/ Corporate Governance
	
Economics	Science/ Innovation/ Environment

To ensure that Board nomination process focuses on creating diversity of the Board members (Board diversity), the Company aligns the process with international corporate governance principles, in which nomination is not affected by race, ethnicity, nationality, or place of birth to affect appointment, and diversity in educational background, knowledge, expertise, skills, experiences, and specialized skills that are relevant to or beneficial to the Company's business is promoted. On 31<sup>st</sup> December 2021, 9 out of 15 Board directors were registered on the State Enterprise Policy Office's list of state enterprise directors. Meanwhile, 7 directors are non-executive and independent directors with expertise and experience in the energy/petroleum/petrochemicals sector. (See more details in the Annual Report 2021 (Form 56-1 One Report), under the "Corporate Governance Policy" chapter on p.93)

Furthermore, Thaioil requires that independent directors must maintain independence from major shareholders, major shareholder groups, and the Company's management executives. Directors should be capable of understanding the financial and business information of the Company, and of other businesses, sufficiently enough to provide unbiased opinions to protect the interests of minority shareholders. The Company expects all directors to regularly attend Board meetings. The qualifications of independent director have been clearly stated, and align with and go beyond the standards of the Capital Market Supervisory Board. For instance, Thaioil requires that independent directors limit their shareholding to no more than 0.5% of the total number of shares with voting rights of the Company, parent company, subsidiary, affiliate, major shareholder or controlling person, including shares held by persons related to that independent director. We also require that the terms of office of independent directors be limited to no more than six consecutive years (from the date of the appointment), to facilitate the Board in completing their duties to advance corporate governance, in line with the Company's strategy. To ensure continuous development of directors' ability to perform tasks effectively, the Company has a policy to promote development and training for directors, such as training courses provided by the Institute of Thai Directors (IOD), or other courses and/or seminars that are relevant to the Company's strategy. In 2021, the Company's Board attended various courses organized by the IOD, including:

- the Director Certification Program (DCP)
- the Director Accreditation Program (DAP)
- the Director Leadership Certification Program (DLCP)
- the Boardroom Success through Financing and Investment (BFI) course
- the Ethical Leadership Program (ELP)

## Roles and Responsibilities

Good corporate governance has been a longstanding priority for Thaioil's Board and executives, in line with the Company's mission "to enrich stakeholders' well-being and deliver sustainable returns built upon innovation, technology, and resilient portfolio with top class management and accountable corporate governance". The Board has specified the qualifications, term of office, roles and responsibilities, reporting requirements, and assessment of board committees in the charter of each committee, as summarized below.



### The Audit Committee

must consist of at least three independent directors that qualify all the requirements of the Securities and Exchange Commission (SEC) and the Stock Exchange of Thailand (SET). The Committee's responsibilities are to review the Company's operations, financial reporting, internal control processes, as well as to select auditors and examine connected transactions. The Vice President of the Corporate Internal Audit Department is responsible for examining the Company's management systems, ensuring there is a functioning system of checks and balances, and reporting to the Chairman of the Audit Committee. The Committee serves to maintain a standard of credibility and integrity in the organization while making certain that the Company's processes maximize benefits for all shareholders.



### The Nomination and Remuneration Committee

must consist of at least three non-executive directors, most of whom must be independent directors. The Chairman of the Board must not be a member of this Committee. The Committee is responsible for considering the criteria and process for nominating qualified individuals for director and executive management positions, reviewing the succession plan of the CEO and President, selecting qualified directors to serve in relevant Board committees, proposing remuneration criteria to suit the responsibilities of the Board, conducting the performance evaluation, and considering the appropriate remuneration for the CEO and President before proposing to the Board for approval.



### The Corporate Governance Committee

must consist of at least three non-executive directors, most of whom must be independent directors. The Chairman of the Board cannot be a member of this Committee. The Corporate Governance Committee takes on the role of supporting the Board in overseeing, determining, and reviewing corporate governance policies and practices. The Committee also plays an important role in sustainability management and corporate social responsibility. Amongst other tasks, the Committee reviews the sustainability management policy to ensure alignment with international standards; determines and drives the implementation of the Company's sustainability strategy; and systematically monitors outcomes of the strategy across the environmental, social, and governance dimensions.



### The Risk Management Committee

must consist of at least three directors, with the CEO and President, by position, serving as one of the members. The Chairman of the Board cannot be a member of this Committee. The Risk Management Committee defines and reviews the corporate risk management framework, which should be conducive for efficient business operations and in alignment with international standards of practice. The Vice President of Corporate Strategic Risk is responsible for aligning risk management measures across the organization and overseeing risk management across all types – including operational risks, strategic and business risks, investment risks, financial risks, human capital risks, climate change risks, and information security and cybersecurity risks – and reporting to

the Chairman of the Risk Management Committee and the Audit Committee. This is to ensure that there is oversight, monitoring, and reviewing of the management of key risks and that measures being placed are efficient and appropriate for the Company's business activities.

In 2021, the Board of Directors oversaw and monitored progress in corporate governance practices, with key actions summarized below.

- At the 2021 Annual General Shareholders' Meeting, the Board reviewed and approved plans and measures to control COVID-19 infection.
- The Board regularly monitored progress in implementing various projects in the areas of corporate governance (CG), corporate social responsibility (CSR), and sustainable development (SD), and reviewed the Company's management of submitted grievances, while providing recommendations and appointing relevant functions to share progress updates on a regular basis.



Please see more details on the members and responsibilities of each committee in the Annual Report 2021 (Form 56-1 One Report), under the "Board of Directors" chapter on p.114

## Corporate Governance and Code of Conduct Manual

The Corporate Governance and Code of Conduct Manual (CG Manual) of the Company specifies that Thaioil directors and executives are expected to act as role models of ethical behavior, and lead by example in upholding organizational values in integrity, fairness, transparency, and accountability. Furthermore, to establish guidelines for Company employees, Thaioil has integrated the Corporate Governance Policy and Anti-Corruption Policy into the organizational management policy – the “TOP Way of Conduct”. This policy serves to standardize practices amongst all companies of Thaioil Group and align our paths towards achieving long-term targets and sustainable development. (Please see more details in the 2021 Annual Report (Form 56-1 One Report), under the “Corporate Governance Report” chapter on p.108)

## Thaioil Group Sustainability Management Policy

The latest version of Thaioil Group’s Sustainability Management Policy is aligned with the UN Sustainable Development Goals (UN SDGs) and reflects global ESG trends in the environmental, social, and governance dimensions.

## Sustainability Performance Indicators

Sustainability performance indicators used to measure organizational performance in sustainability in 2021 are directly tied to the compensation of the President and CEO and the Sustainable Development Committee. Additionally, Thaioil has corporate key performance indicators that are related to sustainability, and are cascaded to all relevant employees. Incorporating sustainability into performance measurement drives Thaioil towards achieving set targets in managing environmental, social, and governance issues. Details are presented below:



### Part 1) Corporate Key Performance Indicators (70%)

Thaioil has established corporate key performance indicators that are aligned with our balance scorecard and “Building on Our Strong Foundation” direction. The indicators reflect three different performance areas and are given similar weights, as shown below:

- 1) 35% for performance in business as usual;
- 2) 35% for performance in strategic initiatives; and
- 3) 30% for performance in strategic enablers and sustainability.

### Part 2) Leadership Competency (30%)

The Company assesses the president and CEO’s leadership competency in building a shared vision, managing the organization in alignment with the strategic plan, managing risks, managing teams to achieve the highest productivity, ability to coach and mentor, and personal excellence.

Sustainability performance is assessed based on performance indicators across the four areas of the balance scorecard and leadership competency.



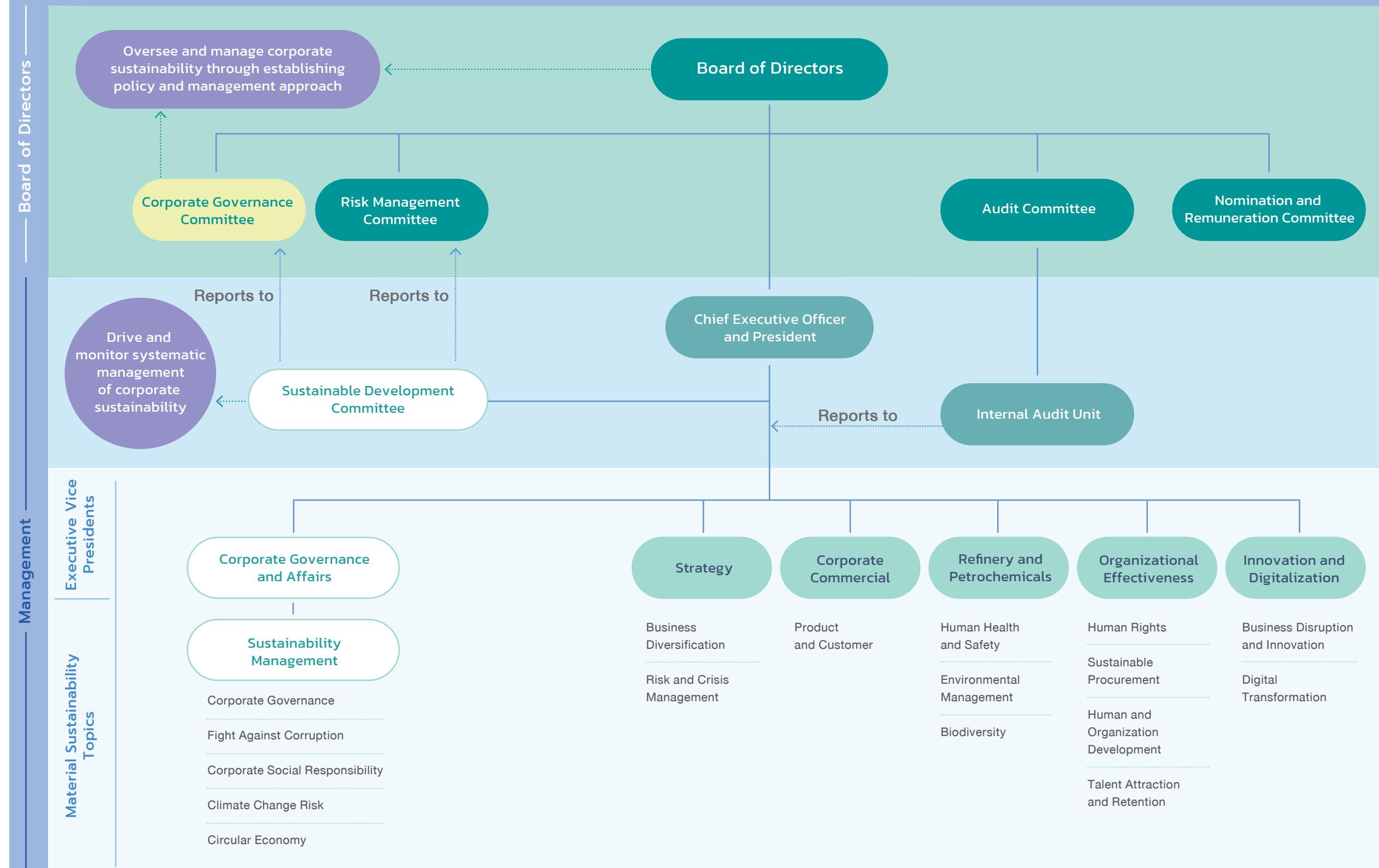
Please see more details on the Thaioil Group Sustainability Management Policy in the Company’s website. To see the policy on the website, go to Thaioil’s website, choose the “Sustainability” section, “Sustainability Management”, then “Policy”. It is also directly available through this link: <https://www.thaioilgroup.com/home/content.aspx?id=152&lang=en>

## Sustainable Development Structure

The Board of Directors prioritizes environmental, social, and governance (ESG) factors in conducting business, and steers Thaioil towards sustainability through establishing policies, strategies, and targets in the short, medium, and long term in the annual Strategic Thinking Session (STS). In the STS, the Board and all management functions are gathered to consider sustainability matters that may create impacts on the business in the future.

Thaioil manages sustainability matters through assigning relevant functions to oversee each issue, with the Sustainable Development Management team coordinating between functions and reporting to the Sustainable Development Committee every quarter. Progress is also reported to the Corporate Governance Committee biannually. The Committee then reports to the Board of Directors to ensure that the Board is regularly kept aware of the state of organizational sustainability. In the event of a pressing material issue that requires immediate attention, the Sustainable Development Committee will notify the Corporate Governance Committee and the Risk Management Committee for consideration and response, the Corporate risk function in parallel reports the results of corporate risk management to the Audit Committee, and implement the specified measures. Finally, this is reported to the Board of Directors. This process fortifies Thaioil's practices and compliance with the guidelines of the corporate strategy, and helps the organization respond to the needs and expectations of all stakeholder groups.

## Sustainable Development Structure



## Sustainable Development Committee

The Sustainable Development Committee consists of the President and Chief Executive Officer, and all Executive Vice Presidents. In 2021, the Committee completed the following:

1. Set Thaioil Group targets to become carbon neutral by 2050 and achieve net zero greenhouse gas emissions by 2060.
2. Supported Thaioil Group circular business transformation in Thaioil Group to develop new products that align with circular economy principles.
3. Reviewed Thaioil Group sustainable development master plan to implement activities according to Thaioil Group sustainability targets.
4. Reviewed Thaioil Group material sustainability topics identified in 2021 and approved the 3Es strategy for sustainability.



### Energy Management and Loss Improvement Working Team

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

### Environmental and Community Relations Committee

1. Determine approach to manage environmental impacts, maintain community relations, and minimize impacts from the Company, in alignment with the Code of Conduct principles on corporate social responsibility. Ensure that stakeholders' expectations and needs are adequately responded to.
2. Manage Thaioil's activities and initiatives related to the environment and community relations such that they are in line with international standards.
3. Analyze and review the effectiveness of activities and initiatives related to the environment and community relations, provide recommendations for improvements, and report performance on environmental management and community relations in line with Thaioil's principles on corporate social responsibility or international standards.

### Waste Management Committee

1. Determine waste management approach and develop waste management plans.
2. Drive the use of appropriate waste management systems and tools.
3. Monitor and report progress and ensure that they are aligned with corporate targets.
4. Review processes and share lessons learned.

### Thaioil Group Circular Economy Working Team

1. Determine circular economy approach, policy, directions, and frameworks.
2. Drive, support, and approve implementation of the work plans and targets.
3. Monitor work progress to ensure alignment with set targets and workplan.
4. Provide recommendations on directions and plans to enable systematic review and improvement processes.

### Thaioil Group Net Zero Greenhouse Gas Emissions Working Team

1. Define approach, policy, and strategy to achieve net zero greenhouse gas emissions.
2. Direct and oversee activities to achieve plans and targets.
3. Track, monitor, and report progress.
4. Provide final approval of the management approach and workplan, and provide support and resources as needed.

	<b>Social</b>	<p><b>Safety, Occupational Health, and Work Environment Committee</b></p> <ol style="list-style-type: none"> <li>1. Review policies and action plans related to occupational health and safety.</li> <li>2. Report and provide recommendations to improve performance and maintain compliance with occupational health and safety regulations and standards in order to ensure the safety of all employees, subcontractors, and any other individual visiting onsite.</li> <li>3. Promote and support the organization of occupational health and safety-related activities, and monitor, report, and evaluate performance.</li> <li>4. Conduct audits of occupational health and safety at operation areas and inspect statistics related to incidents in the area of operations at least once every month.</li> </ol> <p><b>Knowledge Management Steering Committee</b></p> <ol style="list-style-type: none"> <li>1. Determine the right knowledge management approach that will enable Thaioil to become a learning organization.</li> <li>2. Oversee and support knowledge management activities, and ensure alignment with corporate strategy.</li> <li>3. Promote the application of organizational knowledge to create value and increase efficiency for the organization.</li> <li>4. Monitor, review, and assess results regularly, at least once a year.</li> </ol>
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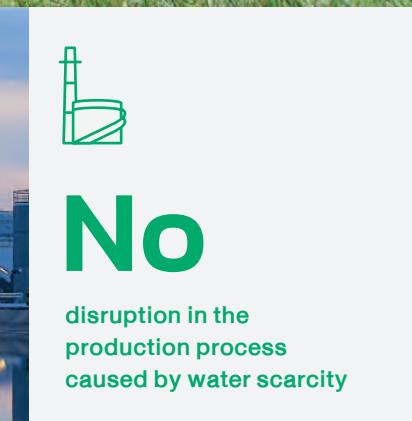
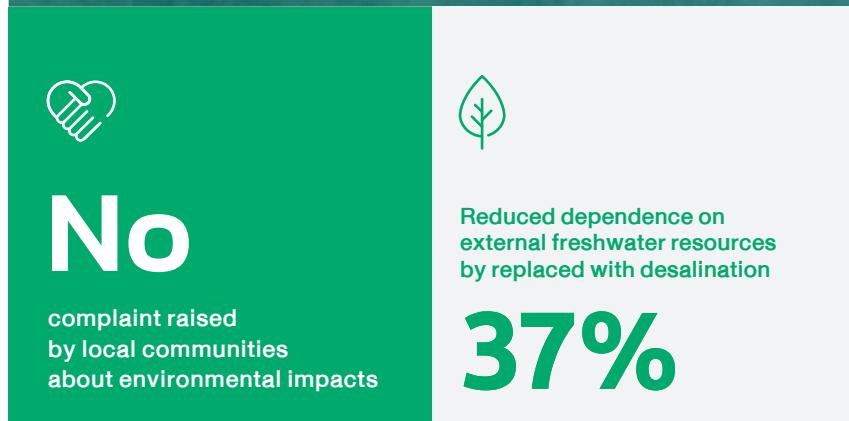
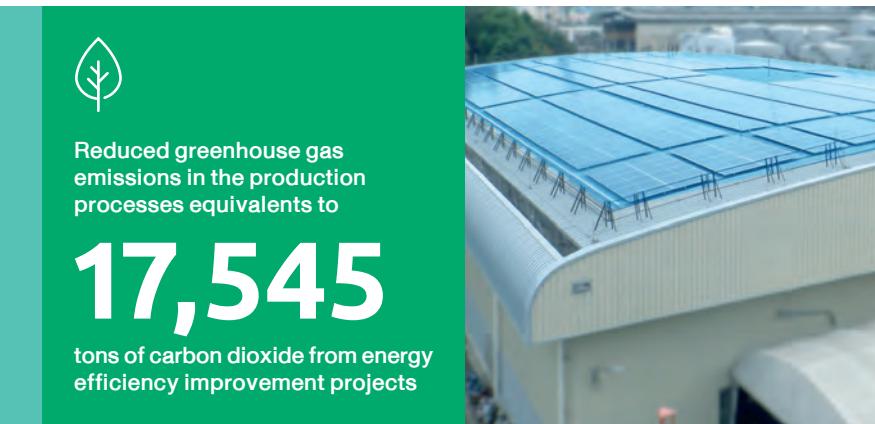
	<b>Economic and Governance</b>	<p><b>Thaioil Group Risk Management Steering Committee</b></p> <ol style="list-style-type: none"> <li>1. Establish risk management frameworks, policies, structure, and strategy, including internal controls and business continuity management, to respond to changing contexts.</li> <li>2. Drive analysis and assessment of the risk levels, and the development of risk mitigation measures.</li> <li>3. Review, monitor, and oversee risk management performance, and regularly report results and progress to the Risk Management Committee (RMC).</li> <li>4. Provide recommendations on plans, processes, guidelines, and allocate resources as needed.</li> </ol> <p><b>Thaioil Group Research and Development Steering Committee</b></p> <ol style="list-style-type: none"> <li>1. Determine the direction, master plan, targets, and indicators that support the strategic master plan, and identify the approach to strategically invest in research and development.</li> <li>2. Support commercialization of research and development.</li> <li>3. Monitor progress and evaluate success.</li> <li>4. Provide research budget, manpower, equipment, and facilities, and promote collaborations with other research institutes.</li> </ol> <p><b>Corporate Venture Capital (CVC) Screening Committee</b></p> <ol style="list-style-type: none"> <li>1. Examine and approve investments in venture capital funds (VC Fund) and in startup companies.</li> <li>2. Report results and performance to the executive management meeting and the Board of Directors meeting.</li> </ol> <p><b>Thaioil Group Digital Steering Committee</b></p> <ol style="list-style-type: none"> <li>1. Determine management approach, policy, and strategy for digitalization in the organization.</li> <li>2. Enforce standards, management measures, and management systems as deemed fit.</li> <li>3. Regularly review, monitor, and report digitalization performance results to the Chief Executive Officer and President.</li> <li>4. Provide recommendations and approve on action plans, and support and allocate resources as needed.</li> </ol> <p><b>Thaioil Group GRC Integration Working Team</b></p> <ol style="list-style-type: none"> <li>1. Study, evaluate, and determine action plans and strategies to integrate practices in good corporate governance, risk management, internal controls, and regulatory compliance, or GRC, across Thaioil Group.</li> <li>2. Determine measures and direct different functions in implementing GRC measures in their management systems, in order to maximize efficiency and align directions across the organization.</li> <li>3. Provide support and strengthen organizational culture, and apply technology to be used in integrating GRC processes.</li> <li>4. Provide recommendations, and monitor and assess performance in line with the action plans and strategies for GRC integration.</li> </ol>
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# Enhance Environment



Enhancing environmental management to ensure the alignment with global directions

The Enhance Environmental strategy steers Thaioil in growing our business while remaining environmentally responsible throughout our business value chain. Through this strategy, we aim to reduce the Group's greenhouse gas emissions by ensuring efficient use of natural resources and aligning practices with circular economy principles. In addition, we will also maintain efforts to continuously increase energy efficiency, explore and study the technical feasibility of applying decarbonization technology in our production processes and carbon removal for the residue emission, as well as seeking opportunities to invest in environmentally friendly businesses and increase the share of revenue generated from environmentally friendly businesses and products. Through these measures, we will enhance the environmental stewardship of the organization to align with global directions.



# ENVIRONMENTAL IMPACT MANAGEMENT



## CHALLENGES, RISKS, AND IMPACTS

Thaioil is aware of the various changes in environmental conditions and external factors. Climate change and temperature increases have resulted in a number of natural disasters such as droughts and floods, while the urban population continues to grow amidst resource scarcity and particulate pollution. On top of the business duty to prevent environmental incidents and preserve biodiversity, the Company has observed increasingly stringent environmental policies and targets communicated on the global stage as well as by the Thai government. For instance, Thailand's ratification of targets for carbon neutrality and net zero greenhouse gas emissions at the UN Climate Change Conference of the Parties (COP) will lead to increasingly rigorous climate change laws and regulations in the future. These are all important challenges that require Thaioil Group to take steps to ensure that the Company's environmental management aligns with global trends, contribute value to communities, and can support future business changes.



## COMMITMENT AND TARGETS

Thaioil Group is conscious of the importance of strengthening the Company's environmental management system to align with international trends, and is driven to secure business growth that is respectful to the environment. We are committed to reduce our impacts and create long term business opportunities alongside our communities while managing environmental, social, and governance (ESG) dimensions, as specified in the "Thaioil Group Policy on Quality, Security, Safety, Occupational Health, Environment, Energy Management, and Corporate Social Responsibility". The Company refers to environmental management systems that are accepted at the national and international levels to continuously improve our management approach and master plan for environmental management.



Please see more details on the Thaioil Group Policy on Quality, Security, Safety, Occupational Health, Environment, Energy Management, and Corporate Social Responsibility on the Company's website, or through this link: <https://www.thaioilgroup.com/home/content.aspx?id=233&lang=en>



### Targets 2021



#### Zero

complaint on environmental incidents



#### Zero

significant oil and chemical spill



#### Zero

non-compliance with relevant laws and regulations



#### Zero

major non-compliance with ISO 14001: 2015



#### 100%

compliance with environmental governance excellence standards of petroleum and petrochemical oil refineries



## MANAGEMENT APPROACH



### Environmental Management

Thaioil Group is committed to fulfilling our responsibilities in the environmental, social, and governance (ESG) dimensions. Furthermore, we have adopted the circular economy framework in driving our organization, and developed strategies and a master plan for environmental management that covers the short and long terms. We are driven to achieve business growth that is mindful of the environment while reducing environmental impacts throughout the value chain.

#### Long-term strategy:

The Company will steer business growth that is mindful of the environment and create long term business opportunities. This strategy contains two sub-strategies – the net zero greenhouse gas emission and the circular economy strategy. In addition, the Company has established a governance structure to drive the implementation. (Please see more details in the Climate Change Risk chapter on p. 48-55 and Circular Economy chapter on p. 56-67)

#### Short-term to medium-term strategy:

The Company will control environmental impacts at the source, accelerate ESG activities, and transform to align with global trends and the long term strategy. Under the direction of the O2Bx Working Committee (Operational Excellence to Business Excellence), the Company will apply the “Refinery in the City” model to current management systems in order to achieve excellence in the three dimensions – namely, environmental management, social management, and governance compliance. In order to efficiently achieve excellence in these three dimensions, Thaioil Group has utilized a management approach called “CARE Concept”:

#### C Control Right

The Company will manage environmental impacts and maintain compliance with rules and regulations. We will prevent and minimize impacts on the communities who may be affected by our production, construction, and transport activities, in order to maintain the trust of surrounding communities (community engagement).

#### A Awareness & Communication Right

The Company will raise awareness, communicate to stakeholders, and build trust in our organization's ability to implement measures to prevent and mitigate impacts from Thaioil Group's business through the Sustainability Policy and Corporate Social Responsibility Policy. We will advance the quality of life of our communities and society, and to pursue sustainable development.

#### R Recycling Right

The Company will implement the 3Rs strategy and circular economy principles in order to manage natural resources for resource efficiency and support the sustainable development goals.

#### E Eco-Society Right

The Partner for Life CSR project will inspire volunteerism and corporate social responsibility in our employees. The Company will promote a “volunteer culture” and encourage employees to design initiatives for communities to “share value with society”.



## Towards Becoming a Partner for Life

### "Refinery in the city model"



To become a global leader in 2022, Thaioil has conducted business sustainably with transparency, sharing benefits with all stakeholder groups, and caring for the environment and the happiness of communities. We have developed an environmental management plan that considers both internal and external environmental factors (Environmental Outlook), alongside the needs and expectations of stakeholders, such as communities, government agencies, management executives, employees who have expertise in environmental topics, as well as the rules, regulations, and global mega trends concerning the environment. All these factors are then reviewed and evaluated to identify opportunities and develop a plan for our work for the next five years. This "Environmental Master Plan" then becomes the main framework in driving Thaioil Group's environmental management to ensure that the management approach is effective, and will lead the organization to achieve environmental targets. Thaioil Group has referred to environmental management systems that are nationally and internationally accepted to improve our management system, including the ISO 14001 standard, best practices in environmental governance, standards on corporate social responsibility (ISO 26000), the CSR – DIW Project, PTT Group's Operational Excellence Management System (OEMS), best practice in biodiversity management, the reporting requirements of the Global Reporting Initiative (GRI), and best practice identified by the DJSI assessment to continuously develop our environmental management approach, whether that be risk assessment, measures to control and minimize environmental impacts, tracking and

monitoring, and reporting. The Company has then applied learnings and improvements throughout the production processes to final products that cover operations in various conditions as follows:

#### Production in Normal Operating Conditions

Thaioil reviews environmental risks, material matters, and mitigation measures implemented to control environmental impacts in the production process from the source on an annual basis. The Company has increased the effectiveness and rigor of our management system continuously through developing a manual that outlines rules in environmental work, and implementing a variety of initiatives to reduce water pollution, waste, air pollution, and greenhouse gas emissions, while protecting biodiversity and efficiently using natural resources. The Company developed the Environmental Master Plan as a framework to guide our work in different areas, including:

- Governance Structure
- Technical Procedures
- Climate Strategy
- Water Resource Management
- Eco-efficiency
- Biodiversity
- Supplier and Contractor Program
- Environmental Audit, and
- Management Information System

For the expansion project, Thaioil Group has applied the standard environmental standard specification, which covers rules, regulations, best practices, and stakeholder expectations regarding the environment, as guidance to implement green construction practices, in alignment with the requirements and expectations of all stakeholder groups.

Furthermore, in 2021, Thaioil Group implemented various projects, including:

**A project to develop an 'environmental dashboard'**, which tracks and presents data on environmental quality such as air and water quality, and allows the Company to efficiently monitor these factors.

**The Environmental Management Accounting (EMA) Project**, which was designed to improve our practices in recording and reporting costs, revenues, and investments relating to the environment, and will support the Company in systematically assessing financial data related to environmental initiatives.

**A project to revisit PTT Group's Biodiversity and Ecosystem Service Management Manual with PTT Group**, and conduct a biodiversity risk assessment for Thaioil Group. The manual was developed based on the integration of standards in Thailand and abroad, such as Thailand's Master Plan for Integrated Biodiversity Management, the GRI Sustainable Reporting Standards, IPIECA standards, and others. Thaioil then applied this manual in assessing biodiversity risks within Thaioil Group. The assessment confirmed that Thaioil Group's area of operations was low risk. Nonetheless, the Company has continued to diligently manage impacts on biodiversity in accordance with the mitigation measures reported in the environmental impact assessment (EIA), and ensure that our operations do not create adverse impacts on the ecosystem, which we recognize is an invaluable resource to everyone.

## Production in Abnormal Operating Conditions

### Abnormal Operating Condition:

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

In 2021, Thaioil Group implemented projects to develop and increase efficiency in managing abnormal operating conditions, such as:

**The TOP Green Tracking-Smell Project** for Air Pollutant Management to increase efficiency in investigating potential pollutant sources.

**The TOP Green Tracking-Oil and Chemical Spill Trajectory Project** to develop a database system and dashboard that can make and present accurate oil and chemical spill movement forecasts. The system is then used in organizing emergency drills and building readiness to efficiently respond to abnormal operating conditions or emergency incidents.

### Environmental Emergency Conditions:

Oil and chemical spill prevention has always been a key priority for Thaioil Group. The Company employs a three-pronged management approach to ensure that we can effectively manage this issue. Details on this management approach and the control measures are detailed below.

## 01 Prevention

1.1 Commit to only use ships that pass the safety standard assessment of the PTT Group Ship Vetting System. Through this assessment, captains from the Company, together with captains from PTT group, review safety documents such as the Ship Inspection Report Program (SIRE) of the Oil Company International Marine Forum (OCIMF), information from international websites, and information on ships serving PTT Group (terminal feedback). We review information gathered and assess ship quality to ensure that Thaioil Group operates marine transportation of petroleum or petrochemicals in accordance with international safety standards.

1.2 Ensure ports, buoys, and other equipment used for oil transfer – such as oil pipelines at the port and offshore pipelines and buoys, safety joints, and ship ropes – are regularly maintained by Thaioil engineers. In 2021, the Company's engineer team inspected a submarine oil pipeline that is used to transport oil to ships through a conventional buoy mooring (CBM) system with pigging. The inspection results showed that the Company's submarine oil pipeline continues to meet industry safety standards.



1.3 Conduct tanker safety checks to ensure safety standards of tankers from Thailand and abroad operating at our port. The port manager will assign responsible persons to conduct random audits regularly. If there are detected defects found, the captain and manager of that tanker will be notified and requested to establish corrective actions and preventive measures to prevent future gaps being repeated. In the event that there is a significant misalignment with safety standards, the tanker may be put on temporary suspension.

1.4 Nominate port division employees to attend meetings and participate in activities organized by the Marine Safety Group of the Oil Industry Environmental Safety

Group Association (IESG). Employees are encouraged to exchange knowledge on marine safety and align Company practices with international standards.

1.5 Organize an annual meeting with the managers of Thai ship companies (Thaioil – Ship's Owner Meeting) to ensure that information on ship and port safety, updated port rules, as well as gaps identified through the random tanker safety audits are communicated, and that corrective actions needed are being implemented to maintain safety in the operations and prevent incidents and environmental damage on ships and ports.

## 02 Mitigation

Beyond the internationally-aligned prevention measures presented above, the Company also has mitigation measures to minimize the negative impacts of unavoidable and unforeseen incidents.

2.1 The emergency response plan outlines measures to contain the oil or chemical spill and clean up all residue as fast as possible. The plan is regularly reviewed and updated to reflect changing external factors and new technologies. We also organize annual oil spill and chemical spill exercises for operators on duty. These exercises ensure that all operators on duty understand their roles and can act in accordance with the emergency plan with accuracy, speed, and efficiency.



2.2 All oil removal equipment, including those stored in the equipment warehouse and on ships, are regularly maintained to ensure that they are readily available at all times to be used to respond to unforeseen incidents. Equipment maintenance is organized on a monthly basis and includes checks such as testing the engines and inspecting the spinning and hydraulic systems. The Occupational Health and Safety, Environment, and Quality teams also conduct random audits to ensure that the equipment is always ready to use at all the time.

### 03 Personnel Development

Thaioil Group sees great value in investing in developing employee knowledge and capacity in oil and chemical spill response. However, due to the resurgence in COVID-19 cases in 2021, planned training activities and exercises were affected and had to be organized virtually instead. International meetings and conferences were also affected and resorted to virtual approaches. Details are presented below.

3.1 The Company organized a marine oil spill response exercise for operators on duty as assigned in the Company's emergency response plan. The exercise simulated a scenario wherein a crude oil pipeline broke while transferring oil at the SBM-2 buoy, leading to an oil spill that spread to Pattaya beach – an important economic hub for the country. The exercise was also inclusive of implementation of measures as outlined in the business continuity plan (BCP). In this exercise, the President and CEO also attended.

3.2 The Company sent employees to attend the virtual Regional Industry Technical Advisory Group Meeting organized on 11<sup>th</sup> – 12<sup>th</sup> November 2021. This meeting was highly informative and beneficial for the Company. Through this meeting, additional opportunities were identified to develop Company plans and build employee capacity.

For 2022, Thaioil Group has the following activities planned:

1. The Company will organize an oil spill cleanup exercise with the Oil Industry Environmental Safety Group Association in Sriracha (IESG-SASC).
2. The Company will organize a training conference on marine oil spill removal and beach cleanup with government agencies – including the Chonburi Provincial Government, Port Authority, and the Thai Maritime Enforcement Command Center – and private sector.
3. The Company will attend the RITAG conference organized abroad.



### Performance 2021



#### Social and Relationship Capital



**100%**

compliance  
with ISO 14001:2015



**100%**

compliance with  
relevant  
regulations, without  
violation of environmental  
laws and requirements



**100%**

environmental  
performance  
compliance with  
environmental laws  
and regulations



**100%**

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



**Zero**

case of  
non-compliance  
from communities  
about environmental  
impacts



#### Natural Capital



**Zero**

case of significant oil  
and chemical spill.

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





## Air Quality Management

With our commitment in reducing environmental impacts and growing our business with environmental care and alongside our communities, Thaioil Group has set targets to manage air quality standards. These include targets for concentration of nitrogen oxide ( $\text{NO}_x$ ), sulfur oxide ( $\text{SO}_x$ ), volatile organic compounds (VOCs), and particular matter (PM). The Company implements a variety of measures to reach our targets through designing and installing technology with high efficiency levels comparable in the international arena to maintain excellence in the production process. The Company also monitors air quality at its source and air quality within the surrounding areas of our operations. Air quality is monitored by external air quality auditors, with data measured in real-time through the Continuous Emission Monitoring System. Furthermore, Thaioil aligns with the Shell International Practice Standard and monitors our air quality performance against the Standard. Moreover, our air quality management system and performance reporting is reviewed and certified by an external verifier every year.

### **$\text{NO}_x$ and $\text{SO}_x$ management**

Thaioil Group has assessed environmental impacts and established measures to control  $\text{NO}_x$  and  $\text{SO}_x$  emissions from the production process in which the majority of emissions stem from fuel combustion. In order to control and reduce the volume of emissions, Thaioil Group installed technology that meets high international standards, and continuously operated the sulphur recovery unit (SRU). The SRU has high efficiency in recovering sulphur from acid gas and turning the sulphur into sulphur liquid products, which can then be used in other industries instead of being released into the atmosphere. Furthermore, since 2010, Thaioil replaced all changeable burners with ultra-low  $\text{NO}_x$  burners to efficiently reduce  $\text{NO}_x$  emissions from combustion. The Company maintained combustion of low-emission and environmentally friendly fuels at a higher proportion than combustion of higher-emitting fuels, and continued to implement the white smoke monitoring project to ensure our ability to promptly manage issues and avoid impacts to communities. Furthermore, Thaioil monitored air quality at its source and in the surrounding community areas through the air quality

monitoring technology of the Continuous Emission Monitoring System (CEMS) and the Air Quality Management System (AQMS). The Company also organizes air quality inspection by an external verifier, and reports performance to relevant agencies through the Environmental Daily Dashboard on a daily basis. As a result, in 2021, Thaioil Group was able to maintain  $\text{NO}_x$  and  $\text{SO}_x$  at levels better than what is required by standards and the organizational targets.

### **VOCs Emissions Management**

Thaioil Group controls volatile organic compounds (VOCs) emissions through assessing environmental impacts, determining preventive measures, and monitoring VOCs emissions from various sources of the production process, including from flares, combustion, tanks, loading processes, effluent treatment plant (ETP), and fugitives, through operational excellence. Details are presented below:

**Flares and fuel combustion:** The Company strictly operates according to determined procedures or guidelines of the production process to maintain combustion with the highest possible efficiency levels and to prevent undesirable incidents that may lead to flares from occurring.

**Tanks and loading processes:** The Company selects tanks that are appropriate for the type of chemical or oil stored, and installs vapor recovery units with 99% efficiency to treat VOCs released from continuous product movement.

**Effluent Treatment Plant (ETP):** The Company regularly tracks and monitors VOCs released from the effluent treatment plant to seek improvement opportunities such as the project to cover the effluent treatment plant.

**Fugitives:** The Company controls and monitors ventilation, and detects leak points, through the use of the VOC leak detection camera. Our practices comply with the rules, regulations, and international standards that have been defined in alignment with the US Environmental Protection Agency standards since 2012. Based on these findings, the Company then seeks improvement opportunities to eliminate leakage.

Furthermore, in 2021, Thaioil Group implemented additional projects to control volatile organic compound emissions. Details are presented below.

**The project to cover the effluent treatment plant** to reduce and control VOCs and odor from wastewater treatment. The project is currently undergoing construction, and expected to be completed in 2022.

**Implementation of The TOP Green Tracking Project** – an air pollution management system that helps increase the speed and efficiency in locating potential pollutant sources. In this way, response and control measures can be promptly implemented. Moreover, The Company engaged relevant functions who could benefit from this system, and provided them with guidance on how to apply this system to their work.

**The research project with the Petroleum Institute of Thailand** – the Company studied additional measures to control benzene emissions in the oil refinery (benzene fence line), and VOCs emissions from flares, tanks, and turnaround, in order to identify additional good practices to control VOCs emissions at its source.

#### **Particulate Matter (PM) Management**

In light of the prevalence of PM 2.5 crisis in various locations across Thailand and abroad, Thaioil Group established the “PM 2.5 Taskforce” to monitor the situation and together determine the Company’s management approach, drive implementation, and continuously communicate corporate initiatives to control PM 2.5. The Company uses the 4Cs approach – which stands for control, contain, clean, and check – to reduce impacts on the environment from its source such as the Company’s offices, operations, construction, and communities. Additionally, Thaioil supports the government’s initiatives and measures. We also regularly track PM 10 and PM 2.5 levels in real time through the Air Quality Management System (AQMS) and with third party inspectors.

In 2021, Thaioil implemented various initiatives under the 4Cs approach, including:

**C-1 Control:** The Company maintained air quality at higher standards than legal requirements. Use of vehicles and

roads were limited through a variety of initiatives, such as encouraging carpooling and use of the Company’s pick-up and drop-off services. The ‘Fast & Flow’ strategy was used to manage traffic flow, while Company vehicles and black smoke levels were closely monitored and controlled at acceptable standards. The Company also inspected and ensured the use of proper covering of dusty material on dump trucks.

**C-2 Contain:** The Company implemented initiatives to contain dust on walkways and carpets to reduce dust accumulation, and installed dust collection nets, as well as used tarp covering to prevent dust from transport vehicles. The Company set up wheel washes in the construction area, installed water sprays, and prepared dust protection masks for employees that need to use them as well as employees in risk areas.

**C-3 Clean:** The Company established cleaning measures in company buildings, lorries, and construction projects, such as carpet cleaning, use of air purifiers, and the 5S activities. The Company also organized the Big Cleaning Day and the TOP Green Road initiative, and supported different government agencies in spraying water to control dust levels on Sukhumvit Road.

**C-4 Check:** The Company monitored the results of the implemented measures (site audit), and tracked dust pollution levels from the Pollution Control Department, the TOP AQMS Lorry station, and the PM 2.5 NONG PIM detector both inside and outside the office buildings closely.



## Performance 2021



### Natural Capital



The amount of NO<sub>x</sub> emissions was **closed to the amount emitted in 2020**



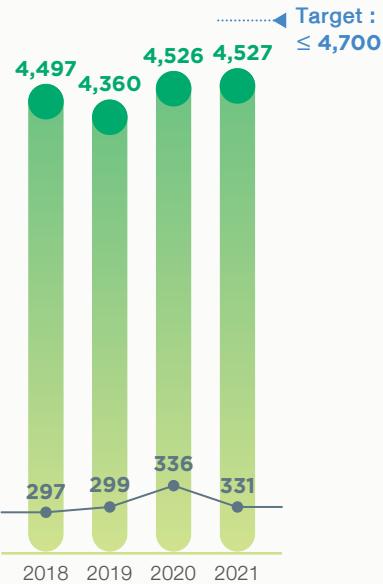
The amount of SO<sub>x</sub> emissions was decreased by **21.41%** compared to the previous year



The amount of VOCs emissions was decreased by **2.10%** compared to the previous year

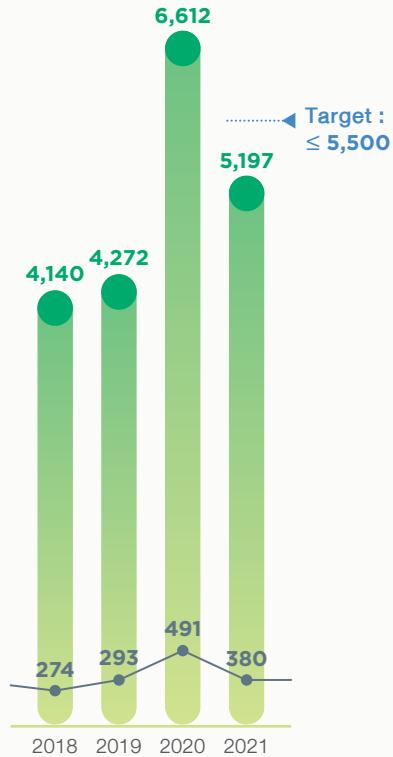
#### NO<sub>x</sub> emissions

● Metric ton  
● Ton per million refinery throughput



#### SO<sub>x</sub> emissions

● Metric ton  
● Ton per million refinery throughput



#### VOCs emissions

● Metric ton  
● Ton per million refinery throughput





# CLIMATE CHANGE RISK



## CHALLENGES, RISKS, AND IMPACTS

**At the 26<sup>th</sup> UN Climate Change Conference of the Parties (COP26), the International Energy Agency (IEA) presented its recent research findings, which found that global temperature is likely to increase even faster than initially forecasted. Without changes in human behavior and activities in the next 20 years, climate change will result in severe impacts on all living beings. At the same time, in order to slow down climate change, industries – especially the energy industry – need to facilitate the transition to cleaner or alternative energy sources. Additionally, since Thailand ratified the Paris Agreement in 2016 and committed to the Greenhouse Gas (GHG) reduction target of 20 – 25% from the 2015 baseline, the country is also recently considering to increase its target to 40% reduction by 2030, and committed to additional targets for carbon neutrality by 2050 and net zero GHG emissions by 2065.**

To propel the country towards accomplishing this target and drive GHG management in the public and private sectors, the Thai government is currently in the process of drafting the National Climate Change Act, or Global Warming Act, which will come into effect in the near future. The new legislation will cover economic mechanisms to incentivize GHG reduction in the private sector, as well as measures to promote change in the behaviour and lifestyles of the population to help mitigate climate change. Examples of mechanisms and measures include developing and promoting public transportation, incentivizing the production and consumption of renewable energy, and advancing the Thailand Integrated Energy Blueprint in the long term.

Furthermore, we are observing significant stakeholder interest in climate change. There is an increase in activism and movement within civil society, investor, and others, who all have expectations of how the oil and gas industry operates its business in dealing with climate change risks and impacts, and how the organization will respond to changes in consumer demand that are moving towards a low carbon society. Thaioil recognizes all these challenges and have assessed risks and opportunities associated with these challenges in order to develop an effective long-term business strategy.



## COMMITMENT AND TARGETS

**The Board and management executives of Thaioil and Subsidiaries are well aware of the criticality of aligning our business with trends in clean energy and low carbon businesses. To that end, the Company focuses our efforts on studying the feasibility of new businesses and high-value environmentally friendly products, while identifying new ways to maximize production efficiency. The Company has also established targets to become carbon neutrality by 2050 and net zero GHG emissions by 2060.**



## MANAGEMENT APPROACH

### Governance and Oversight

The Board reviews the Company's strategy and its relevance to climate change on an annual basis, and assesses potential climate impacts on the business through a risk management process. The Company also tracks corporate key performance indicators related to climate change. For example, the energy intensity index (EII) is one of the indicators used to evaluate the performance of management executives and employees. Performance in this indicator is regularly reported to the Board.

In 2021, the Board reviewed the organizational strategy and agreed to step up the Company's GHG reductions target to better align with net zero mission. The Board also discussed changing the investment portfolio to reflect energy transition trends through continuously increasing energy efficiency and building capacity by investing in renewable power businesses.

This is included in the sustainability strategic plan for the environmental dimension.

Furthermore, Thaioil's management executives approved to form a governance structure to drive the achievement of the net zero GHG emissions target. The Sustainable Development function will provide oversight while working alongside the Strategic planning, Production, Business Development, Research and Development, and CSR functions. They are responsible for assessing climate risks and opportunities, developing action plans to ensure the implementation of Thaioil Group's Net Zero GHG Emissions Pathway, and reporting the results of risk and opportunity management on a quarterly basis to the Sustainable Development Committee – which is chaired by the President and Chief Executive Officer – and on a regular basis to the Board.

### Thaioil Group Net Zero Greenhouse Gas Emissions Governance Structure



## Climate Strategy

Thaioil Group conducts scenario analysis to identify potential climate impacts on the business, and assesses climate risks and opportunities by following the recommendations of the Task Force on Climate-related Financial Disclosure (TCFD). Results are then used to develop an environmental sustainability strategy with short-medium-long term GHG reduction targets.

As the nature of climate change risks and opportunities are rather uncertain, Thaioil classifies climate change as an emerging risk. The Company conducted scenario analysis for three scenarios, including:

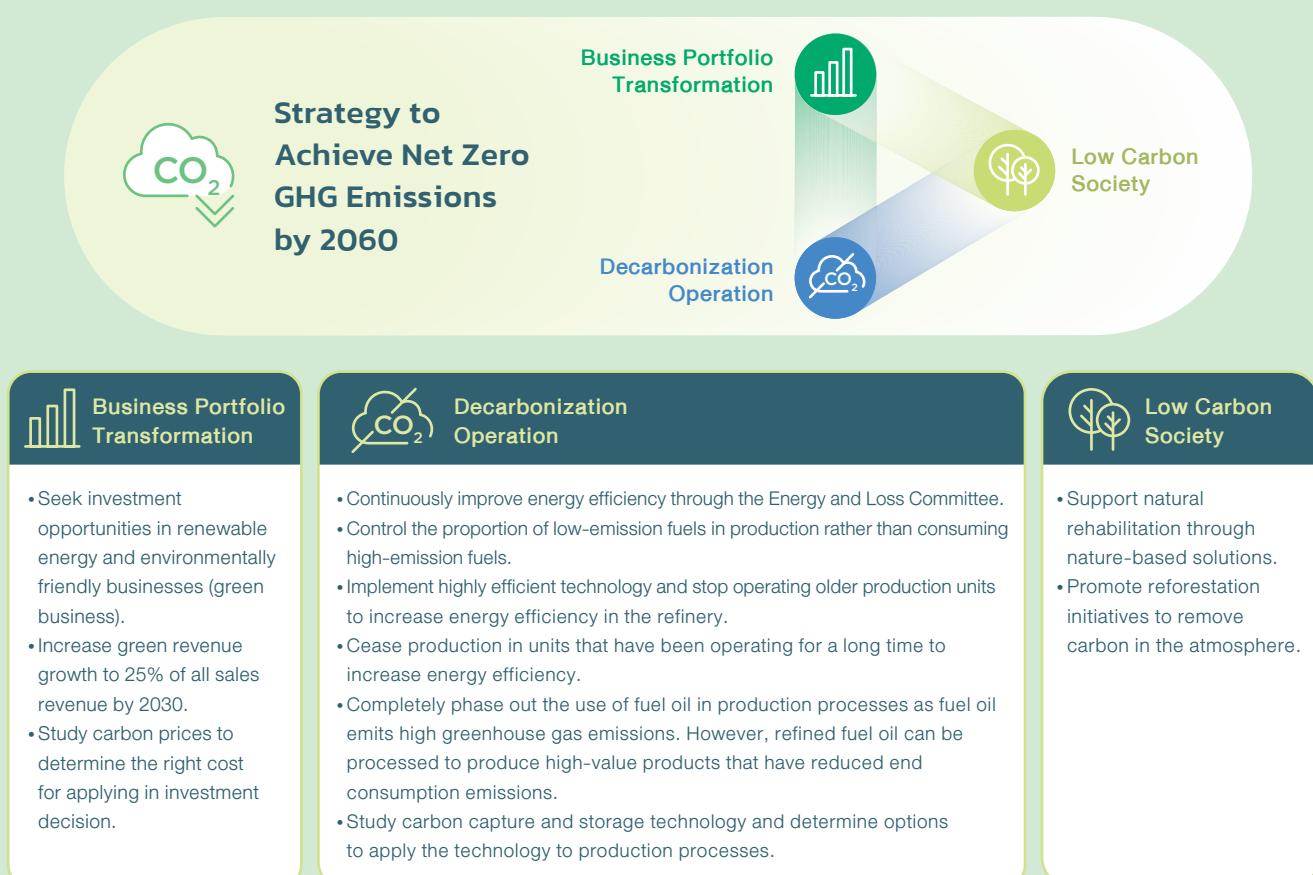
**01 The Baseline Scenario** - The baseline scenario is based on the nationally determined contributions currently agreed to in the Paris Agreement, of which Thailand ratified in 2016 and later at COP26 through the adjustment of the target to 40%

from 2015 baseline by 2030. Based on this scenario, the global temperatures will increase by 3°C by 2100.

**02 The Transition Scenario** - The transition scenario is based on the International Energy Agency's (IEA) 2 Degrees Scenario (2DS), where the global emission reduction target does not fall below 2°C.

**03 Physical Scenario or IPCC RCP8.5** - The physical scenario or IPCC RCP8.5 is the worst case scenario where global temperatures increase by 4°C by 2100.

For each respective scenario, the Company assesses regulatory risks, physical risks, and transition risks for the years 2030 and 2040. Findings regarding the risks are then used to define the Company's strategy and long-term action plans.



## Climate-related Risk Management



### Physical Risks

Physical risks include water scarcity risks resulting from climate change and increased water demand resulting from industrial expansion. The Eastern Thailand region especially is seeing significant increases in water demand resulting from the development of the Eastern Economic Corridor (EEC). Thaioil Group recognizes the importance of ensuring readiness to reduce risks and mitigate potential impacts that may affect our production process, environment, and communities.

In light of these risks, Thaioil Group regularly monitors, forecasts, and assesses water risks, and conducts scenario and sensitivity analyses to model scenarios showing different levels of water scarcity impacts on the production units, with the Enterprise Risk team and the Thaioil Group Water Management Working Committee working together on an ongoing basis. The Company uses the Aqueduct Water Tool – an internationally accepted tool developed by the Water Resource Institute and also join external and public agencies – such as the PTT Group Water Committee of the Eastern Region, the Keyman Water War Room, and the Water and Environment Institute for Sustainability of the Federation of Thai Industries – to build networks for integrated water management across all parties. The Company also adopts proactive measures to reduce associated risks and impacts on the production processes or on communities,

To ensure that we balance business interests with the needs of all stakeholder groups, Thaioil Group has agreed with government agencies that during droughts and water shortages, authorities will first supply water to surrounding communities. Then, only after their needs for daily consumption and agriculture activities are met, the authorities will supply water to Thaioil Group. To make certain that we are ready to adapt in the event that such a situation occurs, Thaioil Group has determined a “Long-term Water Supply Strategy” to reduce water scarcity risks that may affect the business and strengthen the capacity of our business to respond to water scarcity impacts if they may occur. This strategy also ensures that during times of water scarcity, the Company can source water as needed for the expansion project. Details are presented below.

At present, Thaioil uses two types of water – seawater that is processed to freshwater through the thermal desalination unit, and raw water from two different water distributors – the Bang Pra Reservoir by the Royal Irrigation Department, and the Nong Kor Reservoir by the Eastern Water Resources Development Public Company Limited. Both water distributors maintain an

integrated water system alongside Thaioil Group through aligning practices with government policies, or the local context of water use in the area, to supply water for Thaioil Group’s production process – e.g. cooling tower system, demineralization for steam production, and others. To minimize impacts on ecosystems, we consistently improve water quality to appropriate levels and strictly maintain water quality at levels above regulatory standards before discharging into the environment. At the same time, we integrate circular economy principles and the 3Rs (Reduce, Reuse, Recycle) in our water management systems to maximize efficiency in water consumption. (Please see more details on projects completed to reduce water consumption in 2021 in the “Circular Economy” chapter on p. 57-59). The Company is also in the process of studying the feasibility of a number of projects for the “Long-term Water Supply Strategy”, such as:

- **A research project to study the feasibility of installing additional desalination units** to increase the proportion of water consumption from seawater – an unlimited renewable resource – to replace consumption from fresh water – a limited resource. These desalination units will be in addition to the six desalination units that Thaioil is already operating.
- **A research project on recycling wastewater from water treatment plant.**
- **A research project on recycling wastewater from water treatment plant through the reverse osmosis system.**
- **A research project on recycling wastewater from urban communities in Pattaya.**

Additionally, the Company has also completed the following research project and is in the process of extending the contract as follows:

- **The Company is studying the use of private wells as raw water sources** that have adequate capacity and do not affect the water consumption of communities and farmers. In this way, The Company can optimize resource use, diversify our water supply management, and reduce water scarcity risks.



#### Scenario Analysis Results: Physical Risks

**Type of risk:**  
Floods and  
droughts

**Assessment  
timeframe:**  
2030 and 2040

**Risk levels:**  
Low-medium or  
a reduction of  
1-2.5% from  
profit targets



## Transition Risks

### Regulatory risks

include impose impacts on current operations and future investments. For example, since Thailand committed to national GHG reduction targets at the UN Climate Change Conference, the country has seen new regulations and legislation developed to support the achievement of these targets, such as the upcoming national Climate Change Act or Global Warming Act and requirements for organizations to report on their greenhouse gas emissions and on how they support the national greenhouse gas reduction target. Under the Global Warming Act, we also predict to see economic mechanisms such as carbon taxes or emission trading schemes being enforced in the near future. Meanwhile, the government has supported developments and improvements in public transportation systems and promoted production and consumption of clean energy within government agencies. To prepare our readiness to respond with expected regulatory changes, the Company has been closely monitored the development of government regulatory direction and established an environmental strategy to drive the organization towards achieving net zero GHG emissions by 2060. We also participated in a range of government projects in 2021, as listed below:

- **The Company participated in the Low Emission Supporting Scheme (LESS) to support energy efficiency initiatives that help reduce GHG emissions in the organization and in the country.**
- **For the third consecutive year, Thaioil joined the Thailand Voluntary Emission Reduction Program (T-VER) of the Thailand Greenhouse Gas Management Organization's (Public Organization).**
- **We continued to implement renewable energy projects within the Company and beyond to promote clean energy consumption, reduce GHG emissions, and mitigate regulatory risks from climate change.**
- **Thaioil implemented the Thaioil CE (Thaioil Circular Economy) project to increase energy and resource efficiency, and reduce GHG emissions from production, procurement, services, meetings and events, product, and waste management. (See more details in the Circular Economy chapter on p. 56-67).**
- **The Company is currently studying the feasibility and preparing for future carbon credit trading.**

### Market Risks

include changes in consumer behavior and consumption of petroleum and petrochemical products (downstream) towards low carbon lifestyles and energy sources, and crude price volatility (upstream). As these risks affect uncertainty in the Company's sales revenue, Thaioil adjusted the investment portfolio to increase investments in renewable energy. The company is also currently study the feasibility of biofuels, while also seeking new opportunities to invest in businesses in clean energy and environmentally friendly products with the set target is to achieve a green revenue growth of 25% of total sales revenue by 2030.

### Technological Risks

include rapid advancements in technology that may facilitate replacement of oil consumption with alternative energy in the future. At present, we are witnessing many examples of technology development and improvement driving oil substitutes, such as electric vehicles and hydrogen fuel. Governments in several countries have also passed legislation to promote use of alternative energy in replacement of oil, leading to several car-manufacturing companies in Europe setting targets to reduce or cease manufacturing internal combustion engine vehicles. In Thailand, the National Electric Vehicle Policy Committee agreed in its meeting in March 2021 to set a new target of 1,055,000 electric vehicles (including cars, pick-up trucks, motor vehicles, buses, and delivery trucks) in use by 2025. The Committee also adjusted its long-term plan and updated its target to 100% domestic production of electric vehicles by 2035, which is five years earlier than the original plan. The government has continuously provided corporate tax exemption benefits to investors in the electric vehicle industry, of which some public transport agencies are piloting electric systems. With these rapid changes taking place, the oil industry may be unable to adapt in time and suffer setbacks in revenue and long-term business growth.

Thus, Thaioil Group has planned to reduce benzene production to align with forecasted demand reduction, and improve production efficiency through increasing investments in diesel and jet fuel production through the Clean Fuel Project. Furthermore, to support the net zero GHG emission target, Thaioil is currently studying the feasibility of adopting carbon capturing, utilization and storage (CCUS) technology.



### Scenario Analysis Results: Transition Risks

#### Type of risk:

Carbon taxes or emission cap from the emission trading scheme (ETS), changes in market and consumer demand, and rapid technological advancements that may accelerate the energy transition

#### Assessment

**timeframe:**  
2030 and 2040

#### Risk levels:

Medium, or a reduction of 2.5 – 5% from profit targets



## PERFORMANCE 2021

In line with Thaioil Group's Net Zero GHG Emissions Pathway, Thaioil is determined to reduce direct GHG emissions in the production process. Performance in 2021 is detailed in the following section.

### Measures to Reduce Direct Greenhouse Gas Emissions (Scope 1)

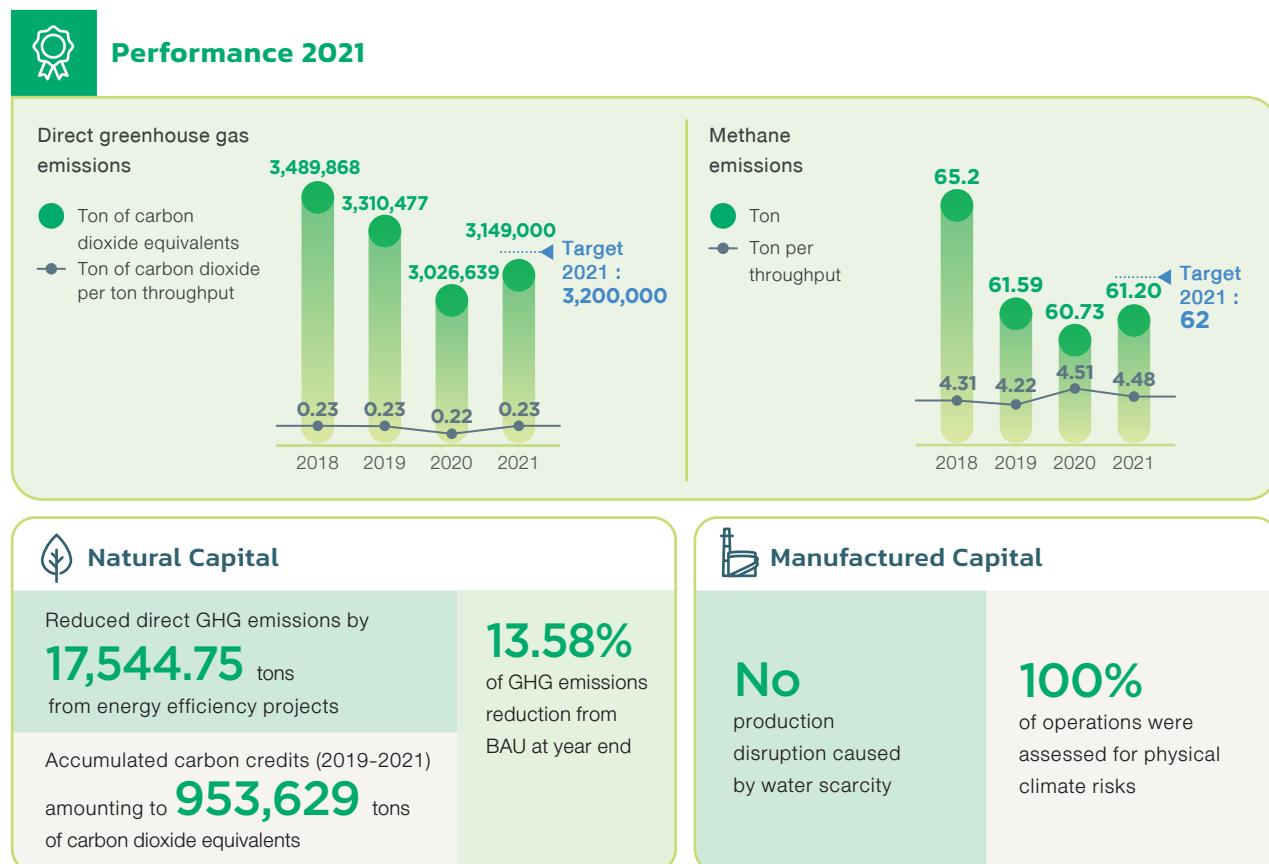
To reduce GHG emissions in the production process, Thaioil Group implements measures that are aimed at improving the organization's energy intensity index (EII). In the past year, the Company implemented 13 energy efficiency projects that together achieve GHG reductions of 17,544.75 tCO<sub>2</sub> e. (See more details in the Circular Economy chapter on p. 59-62) Furthermore, we have completed life cycle assessments (LCA) of all products produced by Thaioil refinery, and are planning to review the results to ensure that they reflect present conditions. Findings will be used to build a database of the carbon footprint of all Thaioil products, which will be critical to making effective plans to reduce GHG emissions from key sources. In the future, the Company aim to expand the scope of this project to cover all companies in Thaioil Group.

Thaioil Group has also implemented renewable energy projects to support our carbon neutrality target, while also participating in GHG reduction initiatives organized by government agencies to support GHG reduction within Thaioil Group and for national targets. Completed activities and their details are described below:

- The Solar Rooftop for Sustainability Project has been completed at the Engineering Building Center, and is undergoing construction at the Satthiwatsawirun Building. This project, which together accounts for a production capacity of approximately 1,000 kW, supporting our renewable energy goals and helping reduce GHG emissions

- To support renewable energy consumption outside the Company, Thaioil installed solar rooftops for Thanyarak Hospital at Mae Hong Son Province, and Koh Sichang Hospital and Laem Chabang Hospital at Chonburi Province.
- Thaioil participated in the Thailand Voluntary Emission Reduction Program (T-VER) led by the Thailand Greenhouse Gas Management Organization (Public Organization) through the 239-MW Combined Cycle Co-Generation Power Plant at Sriracha District, Chonburi Province of TOP SPP Company Limited. In 2021, the Project passed the verification process and was certified with carbon credits for the third year. This year, the Project was certified 310,358 tCO<sub>2</sub> e, thus bringing the accumulated amount of carbon credits to over 953,659 tCO<sub>2</sub> e. Through this Project, the Company supports the transition to a low carbon society in the future.
- Thaioil participated in the Low Emission Supporting Scheme (LESS) through implementing energy conservation projects that were designed to increase energy efficiency. Thaioil selected three energy efficiency projects, including a research project to assess and compare the production efficiency and limitations of Hydrogen Plants 1 and 2 to ensure that the Company can produce enough quantities of hydrogen as needed with the lowest possible energy and cost requirements; a process improvement project to use some of the gas compressors with acceleration and reduce pressure levels in the splitter of the Hydrocracking Unit 1 during reduced production levels; and a project to increase efficiency of the burner in the Refinery Unit 2. Together, the aforementioned energy efficiency projects contributed to the reduction of 16,593.29 tCO<sub>2</sub> e.

As most of Thaioil Group's methane emissions come from the same source as other GHG emissions, the GHG management measures mentioned above also helped the Company maintain methane levels well under the set limit.



### Measures to Reduce Indirect Greenhouse Gas Emissions (Scopes 2 and 3)

Thaioil Group does not have any indirect GHG emissions from purchased electricity and steam (Scope 2), as none of the production units in Sriracha District, Chonburi Province depend on external energy sources.

Measures taken to manage other indirect GHG emissions in the supply chain (Scope 3) are listed below:

- The Company takes effort to minimize GHG emissions resulting from waste disposed to landfill. In 2021, through embedding the 3R principles and identifying opportunities to add value to waste materials, Thaioil Group's performance continued to meet the zero waste to landfill target
- Through selling low carbon products – such as gasohol, biodiesel, and bioethanol – the Company was able to reduce GHG emissions from end consumption.

- The Energy and Loss Committee (E&L Committee) assessed risks and established action plans to reduce oil loss during crude oil transport from the producer to the refinery (ocean loss). The Committee also designed a system to transport the product through a network of oil pipelines to reduce GHG emissions at sources generated from production and transportation through vehicles and tankers.
- The Company promoted the procurement of environmentally friendly goods and services and added value to waste through upcycling under the Thaioil CE WE GO (Thaioil Circular Economy) Project. For instance, plastic waste was upcycled to create QSHE shirts for employees and subcontractors, and food waste was upcycled to produce fertilizer.
- The Company defined the work from home (WFH) policy and encouraged employees and subcontractors to use online meetings to reduce travel.



## Performance 2021

The amount of indirect greenhouse gas emissions (Scope 3)



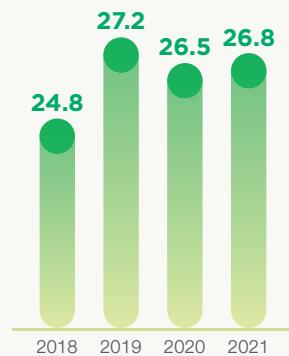
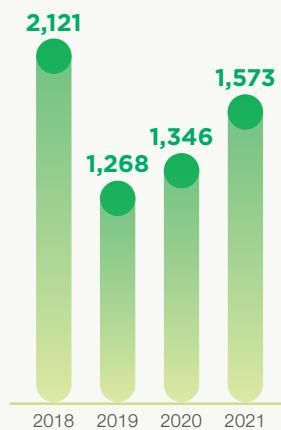
Supplier:  
Waste disposed  
to landfill  
(Ton of carbon dioxide equivalents)



Supplier:  
Oil loss during marine  
transport  
(Ton of carbon dioxide equivalents)



Customer:  
Fuel  
products  
(Million tons of carbon dioxide equivalents)



- The Company continued to advance projects for communities and the environment to promote sustainable management of environmental resources and support the realization of a low carbon society. Through the Renewable Energy Project, a part of our “Sustainable Energy for Healthcare” theme, Thaioil completed installation of a 40-kW solar power system at Thanyarak Hospital, a 53-kW solar power system at Koh Sichang Hospital, and an 80-kW solar power system at Laem Chabang Hospital.



# CIRCULAR ECONOMY



## CHALLENGES, RISKS, AND IMPACTS

The increasing severity of environmental issues in our world today means businesses are posed with key challenges in maintaining business growth. We face a limited supply of natural resource on one hand and rising demand for raw water, energy, and petroleum and petrochemical products on the other. As social and economic growth lead to sharp rises in waste generation, the environment is also facing significant adverse impacts. To grow our business sustainably while respecting the environment, Thaioil Group must carefully manage our natural resource consumption to ensure efficiency throughout our activities.



## COMMITMENT AND TARGETS

Thaioil Group is driven to strengthen our environmental management system to increase resource efficiency. We are committed to implementing robust management systems for water, energy, environmentally friendly products and services, and waste, while also continuously seeking opportunities along the value chain – from upstream to downstream activities – to reuse resources and optimize value. The Company's sustainability strategy for the circular economy material matter, which lies under the environmental dimension, is aligned with circular economy principles as specified in the internationally accepted BS 8001:2017 standard. We have also built partnerships with external stakeholders in government, communities, and others, to increase the efficiency in our management systems, create awareness of the principles, identify business opportunities to develop environmentally friendly products and services, and deliver value to communities. Even during the COVID-19 pandemic, which impacted our work processes, Thaioil Group has adapted plans to the changing circumstances to ensure that we can continue following the organizational strategy and achieve desired outcomes with the highest efficiency.



### Targets 2021

 <p>Water consumption reduction</p> <p><b>105</b> M<sup>3</sup>/Hr</p>	 <p>Share of procurement spending on the materials, equipment, and office supplies product group that is environmentally friendly products</p> <p><b>68%</b> of total spending on the materials, equipment, and office supplies product group</p>	 <p>Waste to Landfill</p> <p><b>0</b></p>
 <p>Energy efficiency ranking compared to peers in the oil and gas industry<sup>(1)</sup></p> <p>2021 Target: <b>2<sup>nd</sup> Quartile</b></p> <p>2023 Long Term Target: <b>1<sup>st</sup> Quartile</b></p>	 <p>Share of sales from environmentally friendly products</p> <p>2021 Target: <b>25%</b> of total sales revenue</p>	 <p>Waste disposed through 3Rs</p> <p>2021 Target: <b>≥95%</b></p> <p>2023 Long Term Target: <b>100%</b></p>

(1) Compared to the energy efficiency ranking of other refinery businesses in the Asia-Pacific region, as ranked in the Solomon Benchmarking report



## MANAGEMENT APPROACH

Thaioil Group's circular economy strategy – "TOP CE WE GO" – was developed based on circular economy principles and the internationally accepted BS 8001:2017 standard. The Company established a working team to oversee the implementation of the plan and to direct the organization towards achieving targets. The working team oversees framing, scoping, idea

generation, feasibility studies, implementation, as well as monitoring and reporting, to optimize resource consumption in Thaioil Group and minimize business impacts on surrounding ecosystems and communities. The committee regularly reports to management executives and stakeholders on four priority areas, including:

### "Thaioil CE WE GO" Project

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



### W: Water and Wastewater Management



Integrated water management is one of the components of the Company's circular economy framework. Thaioil's water management system integrates the 3Rs (Reduce, Reuse, Recycle) throughout all parts of Thaioil Group's water consumption. The Water Management Committee oversees water management throughout the production process, ensuring the efficiency of water consumption from the start to the finish of the production processes, and that water risks resulting from natural conditions are minimized.

In 2021, Thaioil Group implemented additional projects across four main areas, including:

#### 3Rs in Process Water Management Projects, including:

- A project to reducing water consumption in the U-2230 (APU-C) production unit.
- A water recovery project for the TOPSPP power plant;
- A project to reduce backwashing in the side stream filters of the Q-4707 and Q-85010 cooling towers.
- A maintenance project for pipes that are leaking and in need of repair.
- The 'Swop SWS-2 to SWS-5 (APU-C) to save LP steam' project, in which the Company will switch to operate Sour Water Stripper 5 – which can recover condensates – instead of Sour Water 2 to save LP steam.
- A project to recover backwash from the filtration package.



### Pilot Projects for Sustainable Water Management, including:

- The TOPSPP Blowdown RO Project to install a reverse osmosis (RO) system to filter blowdown water to freshwater in TOPSPP.
- The ongoing operation of the desalination unit to increase the proportion of water consumption from renewable resources – i.e. seawater – instead of freshwater from natural sources.

### Projects to raise awareness of the importance of water efficiency and encourage collaborations to increase water efficiency, targeted for employees and subcontractors, including:

- The Saving Water Together 2021 activity.
- A project to promote environmental conservation on the national Thai Environment Day.

### A project to develop a 'water dashboard'

That presents data on water conditions and water consumption. Through this dashboard, Thaioil's operating team will be able to closely monitor water data, and effectively and immediately respond in the event of an unforeseen change to water conditions.



The TOPSPP  
Blowdown RO Project



### Wastewater Management

Thaioil Group maintains the quality of discharged water greater than relevant rules and regulations required before discharging the treated water outside our operational areas. To reduce the volume of wastewater generated, the Company implements measures to minimize water consumption from the beginning stages of the production process. Furthermore, Thaioil Group also designed the wastewater management system to maximize resource and energy efficiency. Since different types of wastewater have varying levels of contamination, the Company classifies three types of wastewater to reduce resource and energy consumption as follows:

- Process effluents.
- Continuously oil-contaminated (COC) water: water used for washing or rainwater runoff at production sites.
- Accidentally oil-contaminated (AOC) water: rainwater runoff in Thaioil Group's operation sites, water used for washing without oil contamination, water used in fire

drills, water from cooling towers, or water from steam generators.

All three types of wastewater are treated through the Thaioil wastewater treatment system. The wastewater treatment system operates 24 hours and is under constant monitoring. The chemical oxygen demand is reported to the Department of Industrial Works in real time through the Chemical Oxygen Demand Online (COD Online), while the quality of wastewater is tested by the Thaioil Group Laboratory and inspected by independent third parties to ensure that the organization only discharges treated wastewater with higher quality than required by regulatory standards. The Company also prioritizes ongoing human capital development through initiatives such as training operators to oversee the wastewater treatment system in order to enhance their capabilities to efficiently manage wastewater. In 2021, Thaioil Group was able to maintain wastewater quality above regulatory standards, and avoid creating impacts on the quality of life of communities and ecosystems.



### Performance 2021

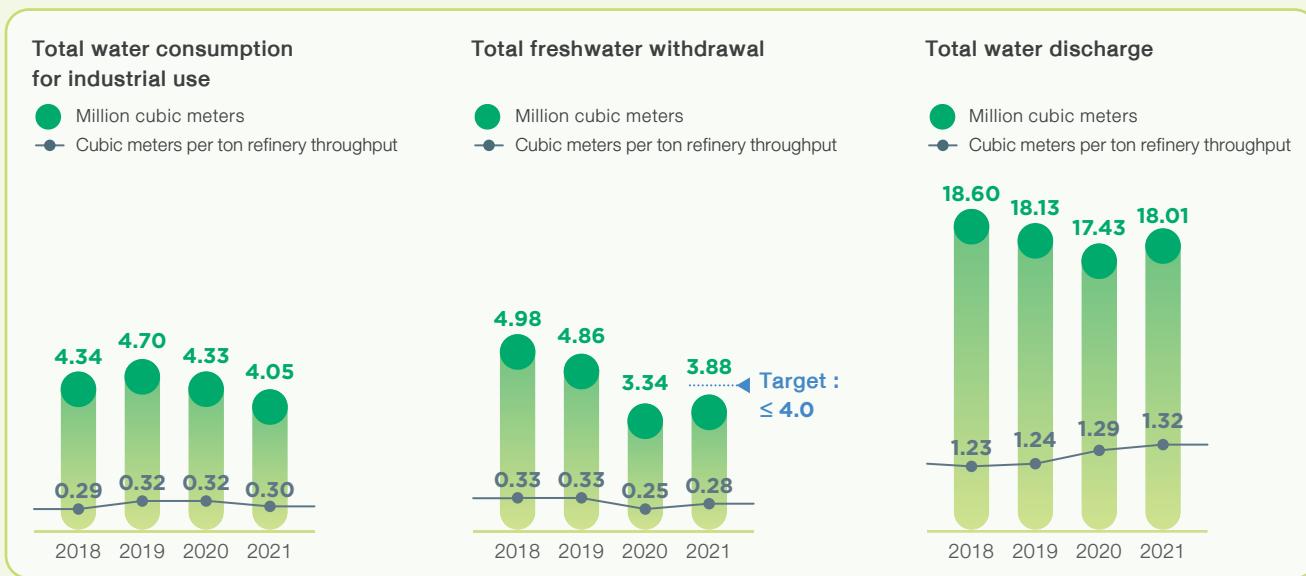


#### Natural Capital

Freshwater consumption replaced by distilled water from desalination by  
**37%**

Total freshwater withdrawal increased by  
**16%**  
when compared to the previous year

Total water discharge increased  
**3.37%**  
when compared to the previous year



## E: Energy Conservation



### Energy Management

As the COVID-19 pandemic situation saw improvements in Quarter 4, demand for petroleum and petrochemical products bounced back and the Company's production increased to respond to this demand. Thaioil Group's energy consumption for 2021 was approximately 27.75 million gigajoules, in which the pattern of energy consumption was similar to the previous year. Nonetheless, throughout this period, Thaioil Group continued to implement energy efficiency improvement projects to maintain energy efficiency amidst changing production levels. In 2021, Thaioil Group implemented a total of 13 energy efficiency improvement projects, effectively reducing energy consumption by 312,740.58 gigajoules, equivalent to 17,544.75 tons of carbon dioxide and 64.62 million THB of cost savings.

In 2021, Thaioil Group implemented energy conservation projects as follows:

1. Process improvement for Crude Distillation Unit 2: To increase the energy efficiency of the Unit, the Company adjusted the levels of steam used for steam stripping.
2. Process improvement for Isomerization Unit: To increase the energy efficiency of the Unit, the Company increased

the rate of feed flowing through the heat exchanger. This allowed more direct heat exchange with the product, thus reducing the need for medium pressure steam to be used to control incoming temperatures, while still maintaining product quality.

3. Temperature reduction for Sulfur Recovery Unit: To increase energy efficiency of the Unit, feed inputs were managed to allow temperature reductions.
4. Assessment of Sour Water Stripper Units 2 and 5: The Company assessed the energy efficiency levels of Sour Water Stripper Units 2 and 5 and reviewed the feasibility of operating only one sour water stripper unit – rather than operating both units at the same time – when production rates and water consumption are low.
5. Assessment of ammonia levels in stripped water: The Company considered increasing the specified maximum limit of ammonia in treated wastewater (stripped water) that has been processed through Sour Water Stripper Unit 5, resulting in the reduction steam used for steam stripping.
6. Process improvement for Parex Unit: To increase energy efficiency, the maximum limit of heavy aromatic



hydrocarbons (C9) in the feed used for the Parex Unit was increased. As the Parex Unit operates separate from the Xylene Rerun Column (XRC) of Thai Paraxylene Company Limited, resulting in the reduction of energy consumption of the XRC unit.

7. Pressure adjustments for the Molex Unit: Through reducing pressure levels in the distillation column that separates raffinate materials from desorbent materials of the Paraffin Splitter Unit (Molex Unit) and the distillation column for aromatic hydrocarbons with molecular structures (PEP Unit) of LABIX Company

The top two projects that resulted in the highest energy conservation in 2021 included a project to reduce minimum turndown capacity for a duct burner, and a project to install two plate heat exchangers. The first project sought to reduce production of excess steam during periods of limited steam consumption by reducing the minimum turndown capacity of steam production from the duct burner in the heat recovery steam generator (HRSG) of TOP SPP Company Limited. This resulted in reduction in fuel consumption. The working group tasked with this initiative first studied relevant variables and studied the minimum turndown capacity as specified in the design manual. Based on these findings, an analysis and risk assessment was completed. Then, the working group developed a manual to ensure that a test run could be completed safely and without impacts on the production process. The second project was an initiative to install two plate heat exchangers to transfer heat from the still-hot long residue from Thaioil Public Company Limited to the Propane Deasphalting Unit and the Solvent Dewaxing Unit of Thai Lube Base Public Company Limited. The working

Limited, the Company was able to reduce fuel consumption.

8. Process adjustments and controls for the Detai Plus Unit: Through making process adjustments and establishing controls for the separation process and distillation column for linear alkyl benzene (LAB) together with the finishing distillation column of the Detai Plus Unit of LABIX Company Limited to ensure that variables are at the appropriate level, the Company was able to reduce fuel consumption.

group first studied the technology of different plate heat exchangers, and developed engineering designs and installation plans. Through this initiative, lost heat energy could be recovered and used in the production process. This helped reduce fuel consumption and increased energy efficiency. Overall, both of these initiatives reduced energy consumption by 117,940.26 gigajoules, equivalent to 6,616.45 tons of carbon dioxide equivalents per year, or 37.71% of total energy saving.



Installation of plate heat exchangers at  
Thai Lube Base Public Company Limited

Furthermore, Thaioil Group implemented energy conservation projects in the workplace. The Company supported and encouraged employees to be more aware of the importance of energy conservation through organized activities and communication channels. A contest was held for employees to share creative ideas to increase energy efficiency in the workplace. The Company regularly shared articles and/or news about energy conservation projects in the Energy and Loss column of the Company's Akanee monthly magazine, and also posted posters and signs to promote energy conservation campaigns and share tips for energy conservation around the office space.



Thaioil organized a contest to encourage employees to share creative ideas to increase energy efficiency in the Company.

In 2021, Thaioil Group was presented with the Thailand Energy Award for Outstanding Work in Energy and Designated Factory Teams. The Company also received a certificate of honor from the Thailand Greenhouse Gas Management Organization for our continuous participation in the Low Emission Support Scheme (LESS), where we have continuously taken action to increase energy efficiency and reduce greenhouse gas emissions.



Thailand Energy Award 2021



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

The Solomon Benchmarking report, which benchmarks energy efficiency across companies, ranked Thaioil Public Company Limited within the 2nd Quartile in comparison to other companies in the Asia-Pacific Region. With the completion of the Clean Fuel Project in 2023, Thaioil will be able to increase our competitiveness and compete for the Top Quartile.

Thai Lube Base Public Company Limited was able to maintain its energy efficiency level in the 1<sup>st</sup> Quartile in comparison with other lubricant manufactures across the world.

Thai Paraxylene Company Limited achieved energy efficiency level at the 1<sup>st</sup> Quartile in comparison to other companies across the world.

LABIX Company Limited has also continuously improved its energy performance by implementing energy conservation projects and increasing capacity in producing linear alkyl benzene (LAB) since mid-2021.



## Performance 2021



### Manufactured Capital



### Financial Capital



### Natural Capital



Energy efficiency ranking was maintained at

### 2<sup>nd</sup> Quartile

in comparison to other companies in the Asia-Pacific region



Operational cost savings as a result of investments in energy efficiency improvement projects were

**64.62**

million THB



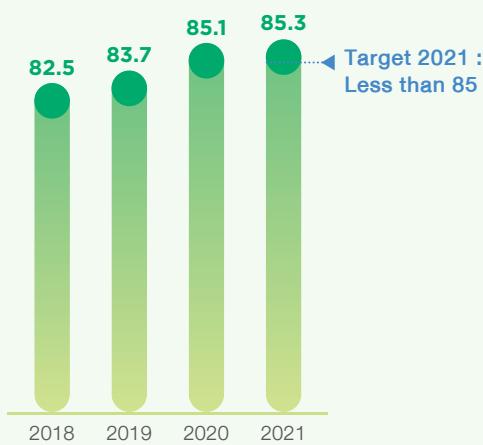
Reduced energy consumption as a result of energy efficiency improvement projects implemented in production processes by

**312,741**

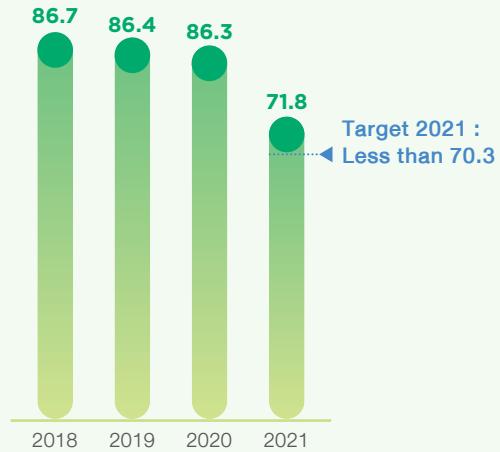
gigajoules



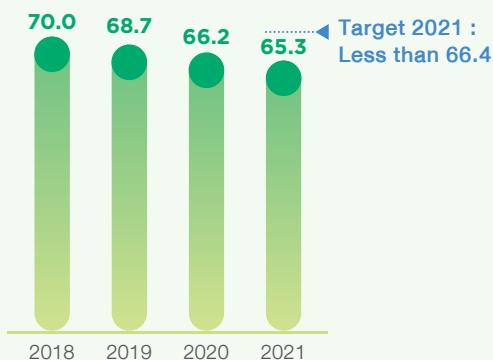
**Energy Intensity Index  
(TOP, TOP SPP)**



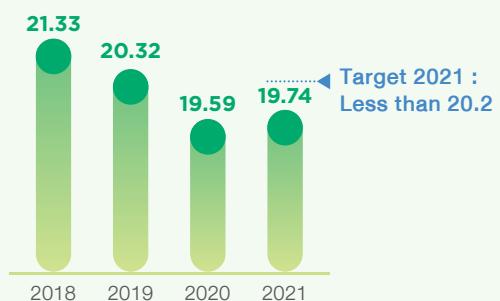
**Energy Intensity Index  
(TLB)**



**Energy Intensity Index  
(TPX)**



**Energy Intensity Index (LABIX)  
(Gigajoule / ton of LAB)**



Despite improvements in the COVID-19 pandemic situation in the 4<sup>th</sup> Quarter of 2021, demand for petroleum has remained low in comparison to pre-COVID-19 levels. Demand for aviation fuels in particular remained low and has not recovered, as we are still observing travel restrictions in Thailand and abroad. This had resulted in a reduction in production capacity compared with the expected production target, causing the energy intensity index to be higher than the set target as the refinery was operating at a much lower production capacity than the designed capacity. Although, the Company has continued to implement energy conservation projects, the energy

intensity index exceeded the maximum limit target we had aimed for. On the hand, for Thai Lube Base Public Company Limited, we had installed additional plate heat exchangers to increase energy efficiency; however, there were issues with the equipment and the exchangers did not function as planned. This meant we had to stop using the plate heat exchangers for some time, and energy intensity also exceeded the maximum limit target we aimed for as well. Nonetheless, energy conservation projects implemented for Thai Paraxylene Company Limited and LABIX Company Limited proceeded as planned and the two companies achieved their energy intensity index targets.



## G: Green Label Focus



### Use of Green Label Product

To reduce the impact of climate change and other environmental impacts, this leads to changes in consumer behavior, industrial sector, and the current government to adjust through focusing more on procuring and driving environmentally friendly goods and services. Thaioil Group realizes the importance to adapt to Green Label Focus which covers the production and use of green products, and sustainable procurement. Henceforth, we have implemented a governance committee in each area to ensure that the set targets achieve effectively and sustainably. The details are presented below.

#### Promoting Green Procurement

Thaioil established the “Green Procurement Taskforce” to manage the procurement of environmentally friendly products and services. This includes selecting environmentally friendly raw materials, equipment, and services, alongside developing environmentally friendly products, managing waste at the source and increasing resource efficiency. To that end, we have also applied the

sustainable procurement standards of ISO 20400:2017 throughout all non-crude procurement processes, and have received certification that our processes meet the standards in 2020. Thaioil Group continues to promote sustainable procurement throughout the supply chain through updating the Thaioil Group Sustainable Procurement Policy and communicating expectations to all suppliers in the annual Thaioil Group supplier seminar.

For procurement of materials, equipment, and office supplies, we have revisited our purchases to seek opportunities to use green products. We believe this will also motivate our suppliers to take action to develop their production processes to create environmentally friendly and avoid adverse environmental impacts in their supply chains. In 2021, Thaioil set a target to increase spending on environmentally friendly packaging by 5% from the previous year. Our performance exceeded this target, as spending in this product group increased by 15% in comparison to 2020, equivalent to greenhouse gas reductions of 3,680 Kg of carbon dioxide.



## Performance 2021



### Financial Capital

Proportion of procurement spending increased in the product categories of environmentally-friendly materials, equipment, and office supplies product group compared from previous year



### Natural Capital

Greenhouse gas emission reductions resulting from purchases of environmentally-friendly products



#### Product Stewardship

In line with government policy, Thaioil distributes diesel fuel to all customer groups. The Company's diesel product portfolio includes high speed diesel and high speed diesel B7 for personal vehicles, and high speed diesel B20 for trucks and buses. Thaioil's petrol stations are equipped to efficiently distribute diesel fuel at different grades. As the government currently has a policy to adjust biofuel content in biodiesel to achieve demand and supply balance in the Thai palm oil industry and support palm oil farmers, the Company ensures that our petrol stations can adjust the biofuel content in our diesel fuel products to align with policy changes at any given time period.

In addition, the Company distributes gasohol products for vehicles that use benzene-powered engines, including gasohol 95, gasohol 91, and gasohol E20. Our petrol stations can distribute fuel products of different grades and accommodate consumer demands, as well as the government policy to promote ethanol consumption.

As for fuel oil products, the Company has maintained flexibility in producing a variety of fuel oil product types with a range of low (0.5%), medium (2.0%), and high (3.5%) sulfur content. This allows the Company to promptly respond to the current demand from the industrials and transportation sectors. Since the 4<sup>th</sup> Quarter of the 2019 financial year, the Company has begun producing and distributing products with low sulfur content – 0.5% and

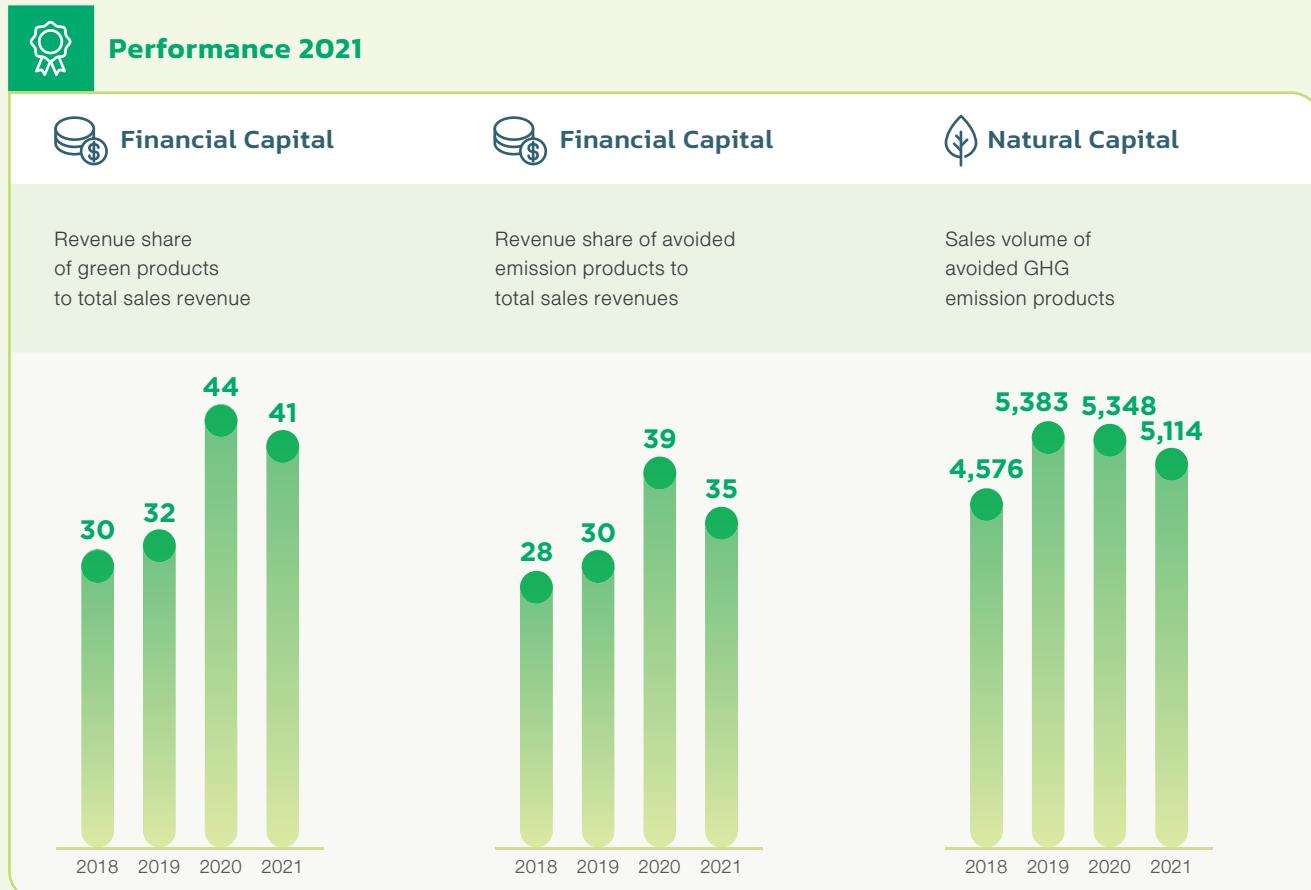
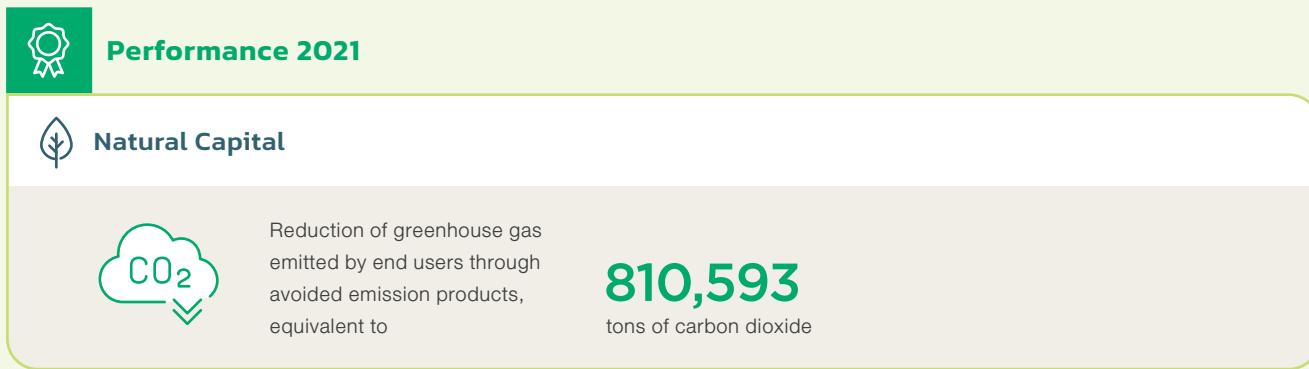
below – to ensure that the quality of our marine fuel products comply with the marine fuel quality standards stated in the Convention for the Prevention of Pollution from Ships of the International Maritime Organization (IMO), which came into effect on 1 January 2020.

Moreover, Thaioil is in the process of completing the construction of the Clean Fuel Project, which will enable production of Euro 5 diesel fuels with even lower sulfur content (10 ppm). The CFP will also allow us to convert fuel oils from our production process into other fuel product types that have higher value and are more environmentally friendly. Through the CFP, this will lead to different refined oil products for Thaioil, which will also respond to the future needs of the market.

In 2021, Thaioil Group had 14 types of environmentally-friendly products, as presented below:

Green Product Type	Product Sold by Thaioil Group	Company	Sales Value (Million Bath)	Sales Volume
 Products that use plants or agricultural outputs in replacement of petroleum (Bio-based Products)	Ethanol from cassava		1,504.09	57.03 Million liters
 Biodegradable Products	Denatured ethanol (from corn)		4.23	77 Tons
 Compostable Products	Glycerine (from palm)		0.012	0.5 Tons
 Products that reduce emissions released to the environment (Emission Reduction)	Linear Alkyl Benzene (LAB)		6,175	128,491 Tons
	Heavy Alkyl Benzene (HAB)		55	1,720 Tons
	Cleaning products (KEEN)		0.339	2 Tons
	Benzene-free solvents, including:			
	• TOPSol BF : Benzene Free		55.91	1,518 Tons
	• Xylene (Isomer) : Low Ethylbenzene		3.6	85 Tons
	Solvents with low concentration of polycyclic aromatic hydrocarbons (TOPSol A 150 ND : Low PAHs)		40.86	865 Tons
	Rubber oils (TDAE, TRAE, AROS) with PCA content below the international limit – thus non-carcinogenic and does not cause genetic mutation in humans		2,348	98,867 Tons
	Low Sulfur Fuel Oil (LSFO or Fuel Oil IMO) with sulfur content at 0.5% or below		10,381	675 Million tons

Green Product Type	Product Sold by Thaioil Group	Company	Sales Value (Million Bath)	Sales Volume
 Products with lower greenhouse gas emissions than products of the same group in the market (Avoided GHG Emission Products)	Cyclopentane CP80, an agent that can replace use of CFCs and HCFCs		8.74	158 Tons
	Gasohol		35,112	1,457 Million litres
	Biodiesel		83,881	3,657 Million litres





## O: Opportunities for Upcycling



### Industrial Waste Management

Thaioil Group is determined to manage our business to efficiently use resources, seek opportunities to recycle and recover waste to optimize value, and minimize waste disposed. The Company is driven to achieve our targets to manage more than 95% of waste generated with 3Rs (Reduce, Reuse, Recycle) methods by 2021, and to maintain zero waste to landfill, after having reached that target for the first time in 2020. To that end, circular economy principles and the 3Rs have been integrated to the production process from start to finish, and the Waste Committee has been appointed to oversee and steer the organization towards achieving our goals.

In 2021, Thaioil Group implemented additional projects across three priority areas, including:

#### 01 CE in Process (Circularity in process):

The Company controls and manages waste from the production process with operational excellence to minimize waste from the production process. For waste that has already been generated, Thaioil Group uses the 3Rs to seek the best ways to add value to the waste generated. Some examples of projects implemented are presented below:

**Copper slag** is a material that is normally disposed as waste. The Company recycled this material instead as raw material for producing brick blocks, in turn also replacing the use of red mud in cement production.

**Through a platinum reclamation project**, the Company increased the value of approximately 24 tons of spent catalyst DeH-15 and enabled it to be reused in other industries instead of having to be incinerated or landfilled.

**The Company processed spent catalysts** – including approximately 32 tons of HDS-2 and 65 tons of EM-1800 Olgone Catalysts – for regeneration, thus avoiding disposal.

#### 02 CE in Office (Circularity in office):

The Company adds value to waste management in our offices and cafeterias through projects. Some examples of projects implemented are presented below:

**The Thaioil Group Zero Waste Project**, Thaioil raised awareness and educated employees and subcontractors in correctly sorting and handling wastes.



**The Fertilizer from Food Waste Project**, Thaioil completed installation of the fertilizer machine, started operating it, and shared the mechanics of the pilot and technology to external agencies through the “Puankookit” (Thinking Partners) show on Channel 3.



**The Upcycling Plastic Waste Project**, the Company collected plastic bottles thrown for recycling and upcycled them into QSHE shirts. These shirts were then given to employees and subcontractors.

#### 03 CE for Society (Circularity for Society):

The Company adds value to waste by turning them into community products through various ongoing projects. An example is shown below:

**Thaioil is bringing products** produced through our circular economy activities to use in the Thaioil Eco Park. The Thaioil Eco Park is a Thaioil Group initiative to create a public park that is accessible for communities. The design of the park has been completed and it is currently in construction.



## Performance 2021



### Natural Capital

Reduction  
in total waste  
generated

**46%**  
compared to  
the previous year

Reduction  
in total hazardous  
waste generated

**38%**  
compared to  
the previous year

Waste  
disposed  
to landfills

**Zero**

Total waste  
managed by 3Rs

**99.99%**  
of total waste generated  
and managed

Total non-hazardous waste generated  
(Ton)

2018		<b>306</b>
2019		<b>2,464</b>
2020		<b>2,619</b>
2021		<b>784</b>

Total hazardous waste generated  
(Ton)

2018		<b>12,707</b>
2019		<b>12,452</b>
2020		<b>8,201</b>
2021		<b>5,078</b>

Total non-hazardous waste recycled  
or recovered  
(Ton)

2018		<b>124</b>
2019		<b>2,136</b>
2020		<b>2,619</b>
2021		<b>778</b>

Total hazardous waste recycled  
or recovered  
(Ton)

2018		<b>12,517</b>
2019		<b>11,787</b>
2020		<b>8,167</b>
2021		<b>5,078</b>

Total non-hazardous waste disposed  
by industrial waste incineration,  
or external wastewater  
treatment services  
(Ton)

2018		<b>182</b>
2019		<b>328</b>
2020		<b>0</b>
2021		<b>6</b>

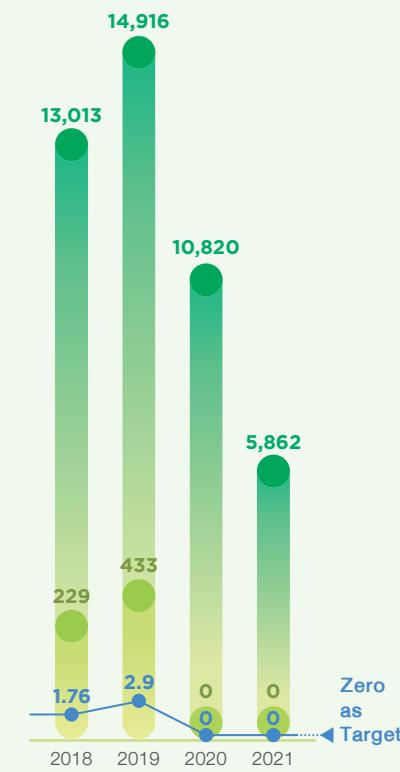
Total hazardous waste disposed  
by industrial waste incineration,  
or external wastewater  
treatment services  
(Ton)

2018		<b>190</b>
2019		<b>665</b>
2020		<b>34</b>
2021		<b>0</b>

▲ Target 2021: ≤ 10

▲ Target 2021: ≤ 25

- Total waste generated and managed\* (Ton)
- Total waste disposed to landfills (Ton)
- Total waste disposed to landfills (% of total waste generated)



\*This also includes waste generated that has already been treated and waste that is not considered part of the production process, including waste from the demolition to prepare for construction for the expansion project at year end. This excludes the waste stored on site at year end. (see more details in the performance summary chapter, p.133-134)

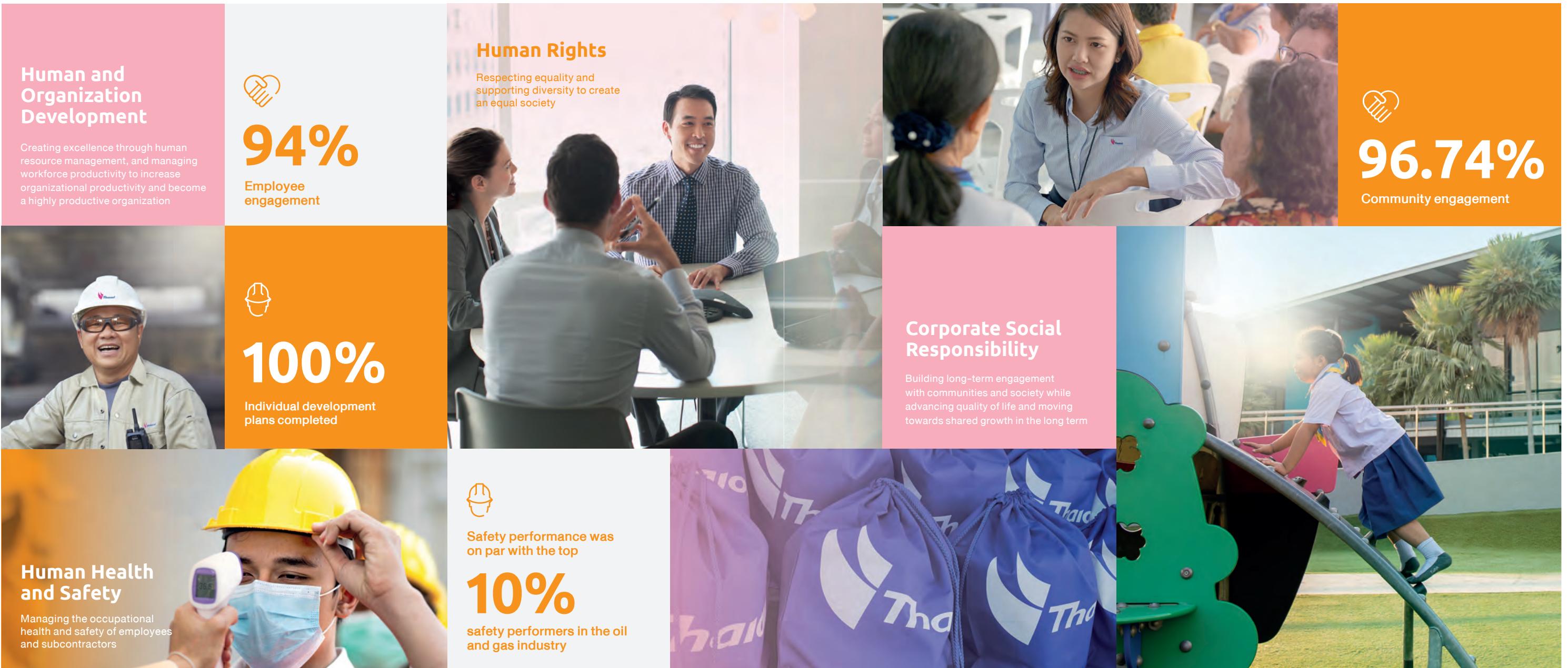


# Engage Society

Empowering community and social engagement along with long-term social value creation for stakeholders



The Engage Society strategy guides Thaioil in advancing the quality of life of our communities and our society through building on the foundation of occupational health and safety management that safeguards our employees and contractors throughout the production process. For communities, this strategy includes goals to build the capacity of local communities surrounding the refinery and for society at the national level. Our strategic areas of focus include education, job creation, quality of life, public health care, and access to clean energy. Furthermore, The Company remains committed to conduct our business with respect for human rights throughout the supply chain in pursuit of sustainable long-term shared growth.



# HUMAN RIGHTS



## CHALLENGES, RISKS, AND IMPACTS

Since the United Nations declared the Universal Declaration on Human Rights 70 years ago, the global community has witnessed various developments in the human rights space drive towards a “universal” human rights framework. In 2017, the Thai government announced a commitment to put human rights at the forefront of the national agenda, and proceeded to develop the 4<sup>th</sup> National Human Rights Plan of Thailand and the National Action Plan on Business and Human Rights. The 1<sup>st</sup> National Action Plan on Business and Human Rights (NAP) for 2019–2021 was then published in 2019 to further efforts in enacting national human rights policy. The 2<sup>nd</sup> NAP is currently being drafted, and with stakeholder participation being organized to ensure that the policy will be well accepted. These developments, in combination with the challenges of operating during the COVID-19 pandemic, have resulted in various impacts on Thaioil. The Company must take special care to prevent potential human rights violations, such as employment of illegal forms of labour or labour practices that are not in compliance with the law, non-compliance in employment or treatment of migrant or forced labour, impacts on community rights during the COVID-19 pandemic, as well as impacts on the safety, engagement and equality to our employees. In light of the aforementioned context and factors. Thaioil has responded to the 2<sup>nd</sup> NAP stakeholder survey and shared our opinions on the draft, while elevating human rights protection in the Thaioil value chain as a priority for the organization.



## COMMITMENT AND TARGETS

Thaioil Group’s commitment to respecting human rights in our operations and across our value chain is demonstrated in how we conduct our business. The Company first defined a Human Rights Policy and the Thaioil Group Human Rights Impact Assessment and Management Procedure in 2015, and recently updated them in 2021 to ensure alignment with the United Nations Guiding Principles on Business and Human Rights, the Core Conventions of the International Labour Organization (ILO), the UN Global Compact (UNG), the International Finance Corporation (IFC) standards, and Thailand’s 1<sup>st</sup> National Action Plan on Business and Human Rights (NAP 1).

To demonstrate our commitment, Thaioil Group appreciates that although governments have an important role to protect human rights and enforce compliance with the implementation of human rights standards – especially labour rights – businesses are also responsible for complying with those standards and maintaining human rights respect throughout their value chains. Henceforth, Thaioil Group is committed to respecting human rights in our value chain and conducts human rights due diligence across all business activities in our operations and supply chain. The human rights due diligence is conducted once every three years, although performance is monitored on an annual basis. Thaioil’s human rights due diligence approach is aligned with the International Finance Corporation (IFC)’s Guide to Human Rights Impact Assessment and Management, relevant UN frameworks, Thailand’s National Action Plan on Business and Human Rights (NAP), and the organizational risk management criteria.

Details of the process are written in the Thaioil Group Human Rights Impact Assessment and Management (HRIAM) Procedure. Furthermore, in 2021, Thaioil also committed to a goal of maintaining zero human rights violation complaints.



For more details on Thaioil Group's human rights policies and principles, please visit the Company website and choose the "Sustainability" section, "I: Our well-being" section, then "Human Rights", or directly access this link: <https://www.thaioilgroup.com/home/content.aspx?id=160&lang=en>



## MANAGEMENT APPROACH

### Thaioil Group's Human Rights Impact Assessment and Management

Thaioil completed a comprehensive human rights risk assessment that aligned with our organizational risk assessment principles, international UN standards, and the Thaioil Group Human Rights Impact Assessment and Management (HRIAM) procedure for human rights due diligence. The Company assessed human rights risks across business activities in our own operations and supply chain. (For more details, please see "Thaioil Group Human Rights Impact Assessment and Management Procedure" on the Company website)

### The Scope of Human Rights Risk Assessment Conducted for Own Operations included:

- Refinery business (Thaioil Public Company Limited);
- Petrochemicals business (Thai Lube Base Public Company Limited, Thai Paraxylene Company Limited, LABIX Company Limited, Thaioil Solvent Company Limited, TOP Solvent Company Limited, and Sak Chaisidhi Company Limited);
- Power and steam business (TOP SPP Company Limited); and
- Supporting businesses (Thaioil Energy Service Company Limited and Thaioil Treasury Center Company Limited).

### The Scope of Internal and External Stakeholders

Included employees, business partners, customers, communities, as well as vulnerable groups, which include women, children, migrant labour, people with disabilities, the elderly, the sick, and LGBTQ+ individuals.

### Human Rights Risk Assessment in Own Operations 2021

In 2021, Thaioil conducted human rights risk assessment that covered 100% of all Thaioil Group business activities, including both the activities that are part of our core business, as well as the activities related to our other businesses and joint ventures. The 2021 human rights risk assessment revealed that 38% of Thaioil Group's activities have residual human rights risks, with 100% of activities with risk mitigation measures.

### Salient Human Rights Issues in 2021



### Human Rights Risk Assessment in the Supply Chain 2021

In addition to assessing human rights risks in our own operations, Thaioil also assesses human rights risks in the activities of our Tier 1 suppliers. This assessment covers 100% of our Tier 1 suppliers, including suppliers from both crude oil procurement and general procurement. The assessment considers the severity and likelihood of each risk based on a human rights risk assessment criteria, with the scope aligned with the Sustainable Code of Conduct for Supplier of Thaioil and Subsidiaries (SCOC). In 2021, the risk assessment revealed that 24% of all supplier business activities have human rights risks. The key risks identified are working conditions and occupational health and safety. Following the identification, the Company implemented mitigation measures for all identified risks. (Please see more details in the HRIAM Report on the Company website)



### Communications and Activities to Promote Human Rights

In 2021, Thaioil Group continued to organize human rights activities for stakeholders under the "3 parts for fulfilling human rights" framework for the second consecutive year. Activities included:

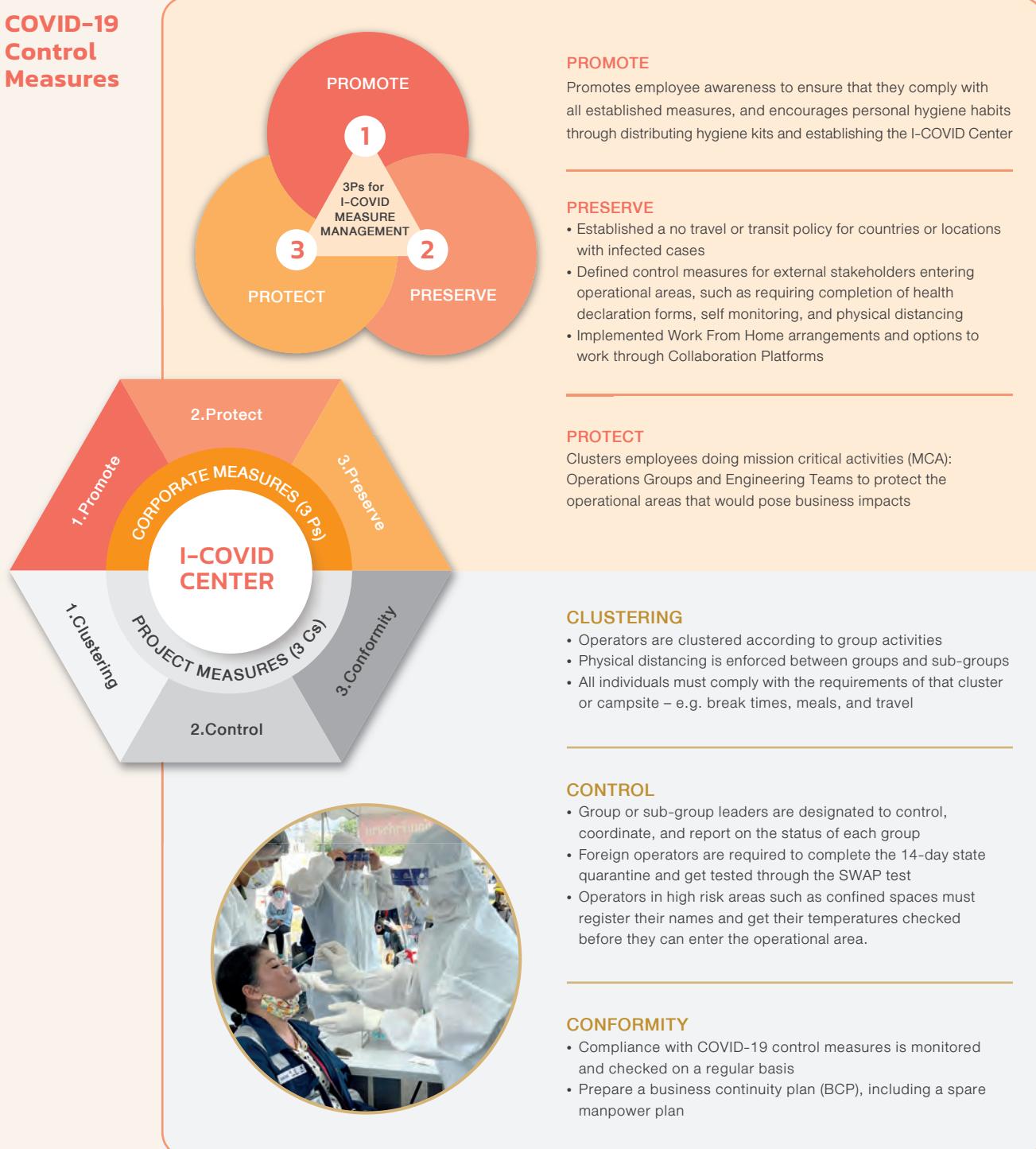
**Ensuring education for all:** The Company implemented a variety of initiatives to ensure that our employees and stakeholders understand human rights and have a human rights mindset. For employees, the Company has developed a Human Rights E-Learning course which is accessible to all employees through the "Thaioil Academy Application". For other

stakeholders, we organized the Human Rights Workshop for Thaioil Affiliates and continuously hosted online lectures (through Microsoft Teams Live) on human rights for suppliers online during the annual Thaioil Group Supplier Seminar in 2021 (SRM Seminar 2021).

**Improving mental health care:** 5 Happiness: Through the New Normal Work Life initiative, the Company raised employee awareness of their own rights, including the benefits that employees and retired employees are entitled to. Thaioil Group also organized the 5 Happiness Project as follows:



**Working with the right to health:** Thaioil Group implemented COVID-19 pandemic prevention and management measures through the I-COVID Center, and enforced controls and policies that align with government direction in order to avoid business disruption from infection in operations and effectively secure the safety and confidence of our employees, subcontractors, suppliers, and stakeholders.



## Good Labour Practice (Labour Rights and Equality)

In 2021, Thaioil Group continued to organize human rights training, communications, and activities to ensure that management executives, employees, and other stakeholders understand Company policies and guidelines, and are well-equipped to prevent human rights violations in our operations and avoid becoming complicit in human rights violations done by suppliers.

Moreover, as one of our sustainability objectives is talent retention, we annually review employee compensation and remuneration packages to ensure that they are competitive with industry peers and leading Thai companies. The Company remains diligent in preventing discrimination and guaranteeing employees their freedom of association and collective bargaining. In 2021, the Company and the Thai Oil Refinery Workers' Union participated in bilateral collective bargaining, with the Company focusing efforts to maintain good labour relations. This resulted in the Company being able to operate with zero labor disputes and achieving an agreement on working conditions in 2021. The agreement was signed on 16<sup>th</sup> December 2021 and will be effective for two years.

Furthermore, the Company has maintained operations without major labour disputes in the past three years. As of 31<sup>st</sup> December 2021, 468 – or 75.24% – of the Company's employees were members of the Thai Oil Refinery Workers' Union. The Company has maintained a record of zero protests or strikes, and the processes have been inspected across 100% of business activities.

As a result of the aforementioned activities, in 2021, Thaioil was given the "Role Model Organization on Human Rights" Award for large businesses for the second consecutive year.



## Performance 2021



### Gender Equality

Employees that are female



2026 Target : 25

Management positions held by women



2026 Target : 40

Junior management positions held by women



2026 Target : 45

Top management<sup>(1)</sup> positions held by women



2026 Target : 35

Management positions in revenue-generating functions held by women



2026 Target : 35

STEM<sup>(2)</sup>-related positions held by women



2026 Target : 35

Remark: <sup>(1)</sup> Top management includes Executive Vice President and Vice President

<sup>(2)</sup> STEM: Science, Technology, Engineering, and Mathematics



### Non-discrimination

Buddhism



employees



management

Christianity



employees



management

Islam



employees



management

Atheism



employees



management



### Freedom of Association

75.24%

of Thaioil employees are members of the Thaioil Refinery Workers' Union

Zero

complaints on labor rights, discrimination, and harassment, with the Company's processes inspected across 100% of business activities

## Good Community Practices (Community Rights)

Thaioil places importance to working with communities around the operation sites. Through the 3 Synchronization Principle, The Company's representatives work closely with representatives of community leaders from all ten communities located around the refinery and government agencies. Through the 5-Together Conceptual Framework, the Company pursues a participatory approach to community engagement, and involve communities in all community development initiatives and help build community strength and self-reliance. This community engagement also serves as a channel for the Company to communicate progress of the expansion project construction, take community feedback and ideas, and collaborate to fix identified issues. In 2021, despite the COVID-19 pandemic, Thaioil Group maintained community engagement activities while following government safety controls. The Company also provided additional support to help prevent infection in communities and respond to their other needs. (Please see more details in the Corporate Social Responsibility chapter on p. 88-97)

Communities are our priority stakeholders, and Thaioil considers environmental impact assessments as a non-negotiable for every major project. The Company ensures that all projects are assigned mitigation measures as needed and that project development is informed by community engagement. In 2021, all major projects have completed public participation as required by law.

## Grievance Mechanisms

Thaioil Group's grievance mechanisms have been designed to receive and manage grievances from all stakeholders throughout our value chain, including any concerns that our business partners may have. It is our hope that through transparently accepting and responding to submitted grievances and concerns, we may reduce social risks on our business, appropriately handle conflicts, as well as strengthen relations with all stakeholder groups.

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

Additionally, Thaioil has designated specific complaint channels for each stakeholder group. These channels enable Thaioil to monitor and collect feedback. For example, suppliers can send complaints or questions through the supplier website or the [srm@thaioilgroup.com](mailto:srm@thaioilgroup.com).

For Communities that have been impacted from Thaioil Group's operations, the company has established a coordinating function to receive report on incidents or complaints directly from the community. This function will work with other internal functions relevant to the incident or complaint, following our established operating procedures for responding in the event of grievances relating to occupational health and safety or the environment. The Company will then establish additional preventive measures to mitigate the risk, reduce the severity, and resolve the issue that is the root cause of the impact in which the implemented mitigation measures will vary depending on the context of the case. The Company mainly uses the Voice of Stakeholder (VOS) management system to collaborate and engage with affected stakeholders to efficiently manage grievances arising from our operations during normal operating conditions, as well as grievances from other expansion projects. Progress in resolving reported issues will be regularly communicated to communities. Ultimately, understanding and reducing community concerns are of utmost importance for Thaioil to manage, maintain, and protect the rights of all stakeholders.



## Performance 2021



### Social and Relationship Capital

#### Zero

human rights  
violation complaints  
from employees

#### Zero

human rights  
violation complaints  
from suppliers

#### 30

complaints

submitted by communities in 2021. The Company has investigated the submitted complaints as stated in our grievance mechanism procedure, resolved the complaints, established further prevention measures, and notified the complainants of the results.

# HUMAN HEALTH AND SAFETY



## CHALLENGES, RISKS, AND IMPACTS

Since its outbreak in 2020, the COVID-19 pandemic has continued to affect people's livelihood throughout the world. People have to adapt to new normal conditions in their professional and personal lives. The refinery business is not exempt to COVID-19 impacts, and also has to adapt to the new context of operations. The Company has to navigate these changing circumstances while pursuing our business plan in expanding the production base. The Clean Fuel Project – currently undergoing construction – is one example of our plans for expansion. Thaioil Group must closely review and strengthen our safety measures to maintain reliability that we can run our business without severe incidents that may disrupt our operations and business.



## COMMITMENT AND TARGETS

Thaioil Group is committed to building a strong foundation on our management systems for organizational personal safety and process safety. To that end, we have enacted a policy that covers quality, security, safety, occupational health, environment, energy management and corporate social responsibility in order to prevent, control, and mitigate impacts that may arise. The policy applies to normal operating conditions, abnormal operating conditions and emergency situations, and is relevant not only for current business conditions but also for future conditions that may change from business expansion. Furthermore, Thaioil remains committed to support our suppliers in maintaining their compliance from the potential regulatory risks associated with relevant laws, rules and regulations, while striving to operational goal of being an organization that is free of accidents (No Harm, No Leak, Goal Zero).



### Targets

#### No Harm, No Leak, Goal Zero

Reach safety maturity

**Level 4**

by 2022

Maintain safety performance of total recordable work-related injury rate (TRIR) within the

**Top 10%**

in the oil and gas industry by 2022



## MANAGEMENT APPROACH

### Employee Health and Safety Management

Thaioil Group's occupational health and safety management system is governed by the Thaioil Group Policy on Quality, Security, Safety, Occupational Health, Environment, Energy, and CSR Policy (QSHE) and the TOP Group QSHE Excellence 2019 – 2023 strategy. Both the policy and strategy drive the Company in building organizational capacity to sustainably and continuously achieve excellence in QSHE. The Company uses an integrated management system that includes:

1. Quality management system aligned with the ISO 9001:2015 standard
2. Environmental management system aligned with the ISO 14001:2015 standard
3. Occupational health and safety management system aligned with the BS OHSAS 18001:2007 standard
4. Occupational health and safety management system aligned with the ISO 45001:2018 standard
5. Integrated management systems (IMS)
6. Management system for the competence of testing laboratories (ISO/IEC 17025:2017)
7. Corporate social responsibility standards aligned with the ISO 26000 standard and implemented for the CSR – DIW Project
8. Information security management system aligned with the ISO/IEC 27001: 2013 standard
9. Energy management system aligned with the ISO 50001: 2018 standard
10. Operational excellence management system (OEMS)
11. Process safety management.

Thaioil currently follows the strategic plan for business excellence (Operational Excellence to Business Excellence: O2Bx) to prepare organizational readiness in becoming a world class refinery by 2022. Safety is one of the pillars of this strategy that has been prioritized for development and improvement. The Company refers to the All SAFE White Green principles to strengthen safety awareness and leadership across all work processes. All SAFE White Green is defined as follows:

All	All Employees and Contractors
S	Standard of Works
A	Awareness on Hazards and Risk Assessment
F	Full Compliance to Work Standard with Proper Site Supervision
E	Ensure Continuous Improvement
White	Drug Free
Green	Environmental Impact Mitigation
No Harm	Organization without Injured
No Leak	Free from Leaks of Hydrocarbons or Hazardous Chemicals from Primary Container

In addition, Thaioil Group takes a proactive strategy to promote safety. For example, building on the management walk and talk activity, Thaioil Group started organizing “GEMBA Walks”, which directly involve management executives. In this activity, management executives inspect operations through conversing with operational staff on their key activities with questions are designed to be specific and build understanding. For high risk activities, recommendations are shared on maintaining both personal and process safety. Moreover, Thaioil has also continued to implement the QSHE Roll Out activity, which focuses on engaging operators and instilling cautiousness regarding quality, security, safety, and environment. In this way, we ensure that we are involving all operators across every operational area. Thaioil Group has also applied appropriate management systems to sustainably develop our activities. Furthermore, the performance of such activities are regularly reported to the management and jointly discussed to identify corrective actions needed. In addition, a management review process is implemented on an annual basis to determine improvement areas and develop work plans for the following year. The process has been consistently communicated to employees to ensure effective practices.

Thaioil Group has designated a team to oversee and drive implementation of the work plan, and established a Safety, Occupational Health, and Working Environment Committee. The Committee is required to maintain at least 50% representation from employees at the operational level out of all committee members (not including the committee chair), and must meet at least once a month to share updates, review implemented activities, and monitor progress of the work plan.

In 2021, The Company implemented key occupational health and safety activities as follows:

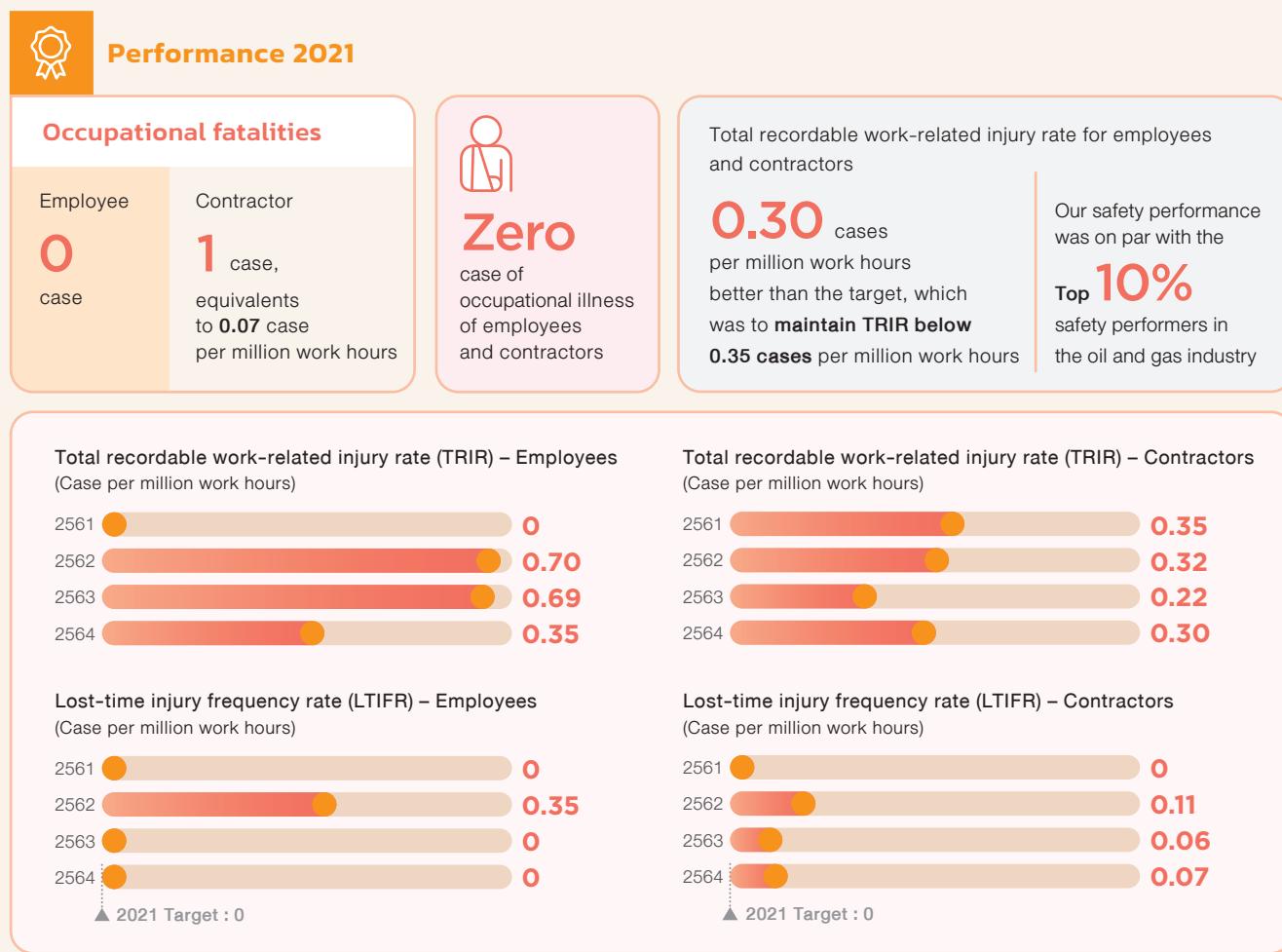
- To ensure that the organizational safety culture starts from the top of the organization, the Board of Directors requested that management executives regularly present case studies and key issues on safety during the Board monthly meetings. These case studies and key issues may come from within the Company or externally, but should serve to promote continuous development in the safety measures of the Company.
- The onsite visit by the President and Chief Executive Officer and management executives during normal operating conditions, maintenance downtime, and construction periods. These visits help build employee morale, reaffirm the Company's commitment to maintaining safe working conditions, and set a good example of safety leadership.
- Updated the strategic business plan for excellence (O2Bx) to build organizational readiness in becoming a world class refinery by 2022, and re-aligned the safety targets with the new strategy – No Harm, No Leak, Goal Zero.
- Reviewed the five-year Occupational Health, Safety, Emergency, and Crisis Management Plan to align with both internal and external conditions, risks, and organizational strategic plans and targets.
- Reviewed, identified, and assessed risks that may lead to serious accidents, and established controls and preventive measures. The effectiveness of the controls and preventive measures were monitored on an ongoing basis throughout the year. Furthermore, the Company conducted safety inspection and analyzes performance, and proposed corrective actions and preventive measures to avoid recurrence of safety incidents. The safety performance was also reviewed by management executives on a monthly basis.
- Reviewed Permit to Work System, with particular attention paid to permits for work with ignition sources near flammable sources, or hot work. All relevant checklists were also reviewed to ensure alignment with international best practices.

- Upgraded contractor safety management to align with international best practice, and the annual contractor safety performance review was completed. The Company continued to record the profiles and safety data of individual and corporate contractors through the electronic contractor safety passports, which also inform procurement practices and supplier management.
- Developed a security, safety, occupational health, and environmental performance evaluation system for contractors, and defined requirements for third party assessments covering management system and operational performance. Through this system, contractors were assessed and ranked into color coded levels of green, yellow, and red. The ranking results were then considered, alongside other criteria, in deciding if the Company would continue business with the contractors. Nonetheless, contractors who ranked under yellow or red levels – meaning their performance still did not meet Thaioil's expectations – were given time to implement corrective actions.
- Established a safety training center to develop the knowledge, capabilities, and skills of employees and contractors. The center is equipped to train in both theory and in demonstration and practice.
- Through the Competency Assurance System, the Company continued to assess and develop the knowledge and capabilities of employees and contractors whose roles relate to safety. This follows the work permit system and the roles and responsibilities as listed in the emergency and crisis management plan.
- Improved chemical management processes throughout the production, product testing, machine maintenance, and manufacturing processes, as well as handling of products and by-products within Thaioil Group, to align with international best practice standards.
- Organized All SAFE White Green MTA Project during the maintenance shutdown in 2021.
- Initiated the "30-60-90 Days with No Harms and No Leaks" activity to reiterate the importance of safety in the workplace to employees and contractors. The target of this initiative was to achieve zero medical treatment case resulting from work, and the Company successfully achieved this target
- Promoted awareness within the workplace hazards such as the line of fire, and communicated the 12 lifesaving rules to

ensure strict compliance. We also continued encouraging the submission of potential incident reports (PIR), emphasizing the importance of identifying unsafe acts and unsafe conditions in preventing safety incidents.

- Reviewed health risk assessment during the annual maintenance turnaround by establishing proactive measures and controls aimed to prevent occupational illness. The effectiveness of the implemented controls and measures was then tracked and monitored by medical and occupational health experts. The Company invested in risk-based health and physical examinations for operators performing high risk activities. Performance was then analysed systematically to identify recommendations and corrective actions to avoid recurrence of incidents.
- Evaluated health performance indicators in accordance with internationally accepted standards, International Association of Oil and Gas Producers (IOGP). In 2020, the Company was scored 3.56 out of a total of 4.00 points. Based on these results, Thaioil developed an improvement plan to close the remaining gaps and meet IOGP criteria.
- Reviewed the emergency and crisis plan, including preparation of response plans in advance, to ensure alignment with international best practices. Meanwhile, the emergency control center was upgraded for a more modern design, and enhanced its readiness and efficiency.
- Continued to follow the COVID-19 surveillance plan. The plan includes three phases. In Phase 0, there are no infected cases and the Company continues preventive and surveillance measures. In Phase 1, suspected or infected cases are identified within Thaioil, but there are no impacts on business operations. In this case, the Company focuses on controlling and preventing the spread of the virus. In Phase 2, a high number of infected cases is identified in Thaioil and there are impacts on business operations. In this case, the focus is on implementing the recovery plan. The emergency control and business continuity center should be active.
- Improved the firewater supply systems and fire retention ponds to ensure readiness to respond to fire emergencies in any emergency situation and at any location – including in the production area as well as in the storage tanks. The Company also procured high performing water guns to strengthen our firefighting capability.

- Conducted risk assessment with high severity, and reviewed safety controls and prevention measures. We also established plans and measures to maintain security and safety in various levels (Defense in depth), ensuring that these plans are inclusive of high severity risks – especially chemical spills from marine transport. The emergency drill is therefore extended to the level of crisis management in collaboration with external and local governmental agencies in order to prevent and reduce impacts on the business operations, while ensuring Thaioil Group can continue to manage high risk activities and control risks at acceptable levels at all times.



In 2021, there was an accident case that involved a contractor at the Clean Fuel Project Construction site, while this contractor was working on the foundation of a new pipe support structure, which resulted in a serious injury. The contractor was then taken to a nearest hospital, and later pronounced dead. As a result of the accident, Thaioil monitored the situation closely, and temporarily halted the construction of the project to further investigate the accident in details. The Company then appointed a committee, consisting of field specialists, to investigate the root cause of the accident and set appropriate measures to prevent reoccurrence. In addition, the lesson learning sharing from the accident was systematically organized for everyone involved.

## Process Safety Management System

As part of the safety pillar in the Company's business excellence strategic plan, Thaioil considers process safety a key priority for continuous improvement. The Company is driven to manage process safety to maintain business continuity while preventing loss of primary containment (LOPC) or process safety events (PSE), as well as incidents that may lead to fatalities, asset losses, adverse environmental impacts, or reputational damage. Thus, process safety management is a key success enabler for the organization, and is critical to building Thaioil Group's capacity to meet the No Harm, No Leak, Goal Zero target and achieve excellent and world class process safety performance.

Since 2018, the Company established a technical safety unit and tasked the team with strengthening the Group's process safety management system and aligning the system with international standards (Occupational Safety and Health Administration : OSHA), while also adopting a proactive risk management approach to prevent serious accidents. As a result, Thaioil Group has been able to operate our business sustainably and maintain safety throughout the value chain.

In 2021, Thaioil Group implemented process safety activities in alignment with international standards and best practices. Details are presented below:

- Reviewed the process safety management system against the international OSHA standards on process safety and international best practices.
- Reviewed the five-year process safety work plan to identify areas to elevate process safety and align with international best practices.
- Reviewed and enhanced all safety critical equipment (SCE) to ensure alignment with mechanical integrity requirements. It is considered one of the key aspects of process safety management (PSM).
- Enhanced and aligned the management of change (MOC) process with international best practices to prevent safety incidents and mitigate potential impacts that may result from production process changes, in which aspects related to change management such as engineering design, risk prioritization, and safety controls were reviewed. Furthermore, every change related to the production process must be approved by responsible persons before any action can be taken, and a test run is required before operations can resume as normal.
- Reviewed risks and control measures to prevent serious hazards that may occur at each stage of the production process through the hazard effect management process (HEMP). This ensures that preventive measures or safety devices that have been designed and implemented remain effective and efficient, and process safety risks are controlled at acceptable levels at all times.
- Developed and enhanced the technical authority (TA) system to align with international best practices, and applied it in the management of change (MOC) process. This ensures that every change related to the production process is systematically reviewed and certified by a technical expert so that all parties involved are able to operate safely and sustainably.
- Strengthened process safety awareness through sharing the 10 Process Safety Fundamentals and implemented the Process Safety Management and Barrier Thinking initiative. In addition, management executives also visited operators onsite to get updates on key activities. In this activity, called the "GEMBA Walk", management executives use a particular set of questions and focus on providing recommendations while also building an understanding of personal and process safety risks on the ground.
- Completed process safety inspection with designated inspection plans and checklists, reporting, monitoring corrective plans, and systematic performance evaluation.
- Developed a Process Safety Competency Development Matrix according to the direction given by the community of experts (COE), covering the knowledge and skills needed to successfully fulfill their assigned roles. The matrix covers key roles relevant in process safety, process safety training, and assessment of knowledge and capabilities in accordance with the specific criteria to ensure employees are equipped with process safety knowledge and capabilities for the assigned tasks, and strives towards excellence in process safety and corporate sustainability performance.
- Developed the pre-startup safety review (PSSR) process, including the safety protocol and checklist (PSSR checklists), and enhanced the process to align with international best practices for the preparation for the Clean Fuel Project that will start operating in 2024.
- Encouraged employees and contractors to study lessons learnt from previous incidents, as well as existing international best practices, and apply this to improve Thaioil's process safety and emergency management. This is to prevent major

accidents and align the organizational emergency and crisis management to the levels that are comparable with international standards.

- Raised awareness and prevented leakage of hydrocarbons or hazardous chemical leakage from heavy containers (Loss of primary containment prevention: LOPC prevention) through reviewing and developing an LOPC chain and management process to cover reporting, investigating, analyzing, and learning from the past LOPC incidents (learning from incident: LFI). The Company adopted a proactive prevention strategy – for example, corrosion under Insulation inspection, flange assurance, and gasket control. In addition, the steering committee was formed to drive and support LOPC prevention project to achieve required safety goal.

- Organized a brainstorming activity to identify ideas that could be integrated into the work plan and applied to all operational sites.
- Determine leading and lagging process safety performance indicators in accordance with the American Petroleum Institute Recommended Practice 754 (API RP 754), and increased recording and inspecting of high potential incidents (HPI). Other important implemented control measures included root cause investigation, measures to prevent serious incidents, promoting learning, and fostering an effective safety culture. Moreover, the Company's process safety performance was reviewed on a weekly basis by management executives.



In 2021, there was one case that qualified as a Tier 1 process safety event as defined by API 754 – i.e. leakage of flammable or chemical substances from the primary containment or the production process that resulted in severe impact. This is equivalent to a process safety event rate of 0.06 events per million work hours, thus not exceeding Thaioil's 2021 target of no more than 0.15 events per million work hours. Thaioil investigated the root cause of the incident to determine measures to prevent reoccurrence. The investigation found that the detection system and authority in charge were able to detect the incident early and could control the incident promptly. Thus, there was no interruption in the production process.

# HUMAN AND ORGANIZATION DEVELOPMENT



## CHALLENGES, RISKS, AND IMPACTS

Whether it is the increasing integration of digital technologies and daily life, the rising importance of the environment and clean energy, the outbreak of new diseases, or changes in consumer behavior driven by younger generations, organizations all over the globe are pushed to review their business strategies to respond to global megatrends that are rapidly becoming reality. In order to achieve their visions, missions, and sustainability targets, businesses must critically evaluate their business strategies. Human and organization development strategy is undeniably a key part of this.

In response to these business challenges, Thaioil Group promptly developed a strategic plan to expand our business in Thailand and abroad, in order to grow our business from the petroleum industry to the petrochemicals business and other new businesses. To realize this plan, the Company must recruit the talent needed to propel the business forward. Thus, Thaioil Group must expeditiously review the strategic plans for human resource planning, recruitment, and knowledge and skill development and align them with the business strategy and plans.

Furthermore, Thaioil Group continued to face external challenges, such as the COVID-19 pandemic, which created ongoing impacts on employees' work and daily lives. The organization has had to seek new ways of work to accommodate employees' various needs while supporting them in balancing their personal and professional lives and maintaining their engagement with the Company.



## COMMITMENT AND TARGETS

Thaioil Group has long recognized that the heart of an organization is its "People". The Company places employees as the top priority for the organization, as attested by our "People First" commitment. Our human and organization development strategy is clearly defined in the Business 5 Years Master Plan and serves to support the organization in sustainable development. The strategy covers three priority areas, as detailed below.



### Strategic Workforce Planning and Recruitment (People Capacity)

Thaioil Group prioritizes strategic workforce planning and recruitment as key to supporting the business strategy, enabling business expansion at each stage, and maintaining a competitive workforce in comparison to industry peers.



### Human Capital Development (People Capability)

Thaioil Group prioritizes human capital development to ensure employee readiness – both in technical expertise as well as in business acumen – to drive the business forward. The Company promotes career development paths and knowledge management practices to retain organizational knowledge and add business value to the Company.



### Creating a Positive Employee Experience (People Experience)

Thaioil Group prioritizes employee satisfaction and engagement, and aspires to be named "The Best Employer" in the future. To that end, we are committed to creating positive contributions to our employees' quality of life, and creating valuable work experiences amidst new normal working conditions.

Furthermore, Thaioil Group has applied digital technologies to advance human and organization development throughout our organizational systems in order to increase work efficiency and create positive experiences for our people.



## Long-term Five-year Targets



Workforce planning:  
Level of workforce productivity at the  
**75<sup>th</sup>**  
percentile in comparison to industry peers



Human capital development:  
Employee capability readiness at  
**90%**



Creating a positive employee experience:  
Employee engagement rate at  
**85%**



## MANAGEMENT APPROACH

Based on an analysis of external conditions and internal factors within the organization, Thaioil Group identified challenges, risks, impacts, and human and organization needs. The Company then developed strategic plans for the short and long terms to support the organization in sustainably and securely accomplishing organizational strategy and targets. Performance highlights in 2021 are detailed in the following section.



### Strategic Workforce Planning and Recruitment (People Capacity)

Thaioil Group's "MIND" strategy includes strategic workforce planning, workforce competitiveness enhancement, and proactive recruitment and hiring. This strategy increases the Company's capacity to attract target groups' interest to work with Thaioil Group, and supports the Company in recruiting individuals that are well qualified to support the business, both in its existing operations and in preparing for new businesses in the future. Thaioil reviewed and adjusted the workplan to adapt the approach for the COVID-19 pandemic, and in this way, maintained efficiency in recruitment and hiring despite the pandemic.

#### M anpower Sourcing Efficiency

#### I nnovate New Pipeline For New TOP Seed

#### N ew Reform Recruitment Process

#### D igital Recruitment Transformation

Select quality recruitment sources, focusing on online channels to maximize effectiveness and efficiency.

Innovate diverse recruitment channels to attract targeted talent with profiles that align with the Company's current and future businesses.

Adapt and expedite the recruitment and hiring process to support business needs promptly.

Enhance the recruitment and hiring process through applying digital technology across all stages



## Performance 2021



### Human Capital



Ability to recruit of employees in desired positions

**90%**



Reduced time to fill from

50 days to **40** days

(Time to fill is the number of days from when the manpower requirement was received until the employment contract was signed with the candidate)



### Social and Relationship Capital



Awarded scholarships to

**122** students

from 19 academic institutions



Provided internship opportunities to

**58** students

from 21 academic institutions during the COVID-19 pandemic



Shared knowledge and career advice to students at

**20**

academic institutions through both in-person visits and online channels





### Human Capital Development (People Capability)

Human capital development in the COVID-19 context presented many challenges. The Company had to ensure employee readiness and support them in attaining a diverse set of skills, while also adapting the approach to organizing employee development activities to correspond with new normal conditions. At the same time, Thaioil Group must also build employee capability in time to support the business strategic plan, which consists of three strategies – Value Maximization: Integrated Crude to Chemicals, Value Enhancement: Integrated Value Chain Management, and Value Diversifications.

Henceforth, Thaioil Group is determined to build upon and further develop our human capital development activities. We create

various self-learning opportunities for employees. Through the Thaioil Academy – a digital learning platform – employees can select topics relevant to their work or other topics of their interest and build a diverse set of knowledge, skills, and capabilities. In this way, they will become well equipped to drive the business in the future.

Furthermore, Thaioil Group builds employee competency through the Intensive Dual Track Development initiative. This initiative centers on a combination of knowledge exchange and practical experience based on the 70-20-10 principle. Through this initiative, the Company invests in building employee expertise, readying them for work, and strengthening their ability to achieve performance excellence, so that they may also create value and benefits for the organization.

Course	Development Approach	Benefits Created
<b>1 Core Competencies</b>		
1.1 Digitalization	Knowledge exchange with experts and practical experience	Employees are taught the digital mindset and trained on trends and tools for data analytics. Employees are also given the opportunity to try developing analytics reports and share their learnings with their teams.
1.2 Innovation	Knowledge exchange with experts and practical experience	Employees learn about innovation culture, design thinking, and innovative entrepreneurship, and apply these mindsets to brainstorm and identify ways to increase the effectiveness in their daily work.
1.3 Business Excellence	Learning through simulation and practical experience	Employees gain an understanding of the business value chain and ways to improve work processes for more efficiency, and learn to apply the knowledge they have gained to their work.
<b>2. Expert Development</b>	Knowledge exchange with experts and practical experience	This course further enhances employee skills and expertise such that they can apply what they learn to their work, and supports employees in their development path towards becoming experts in their fields. The course also supports knowledge retention in the organization.

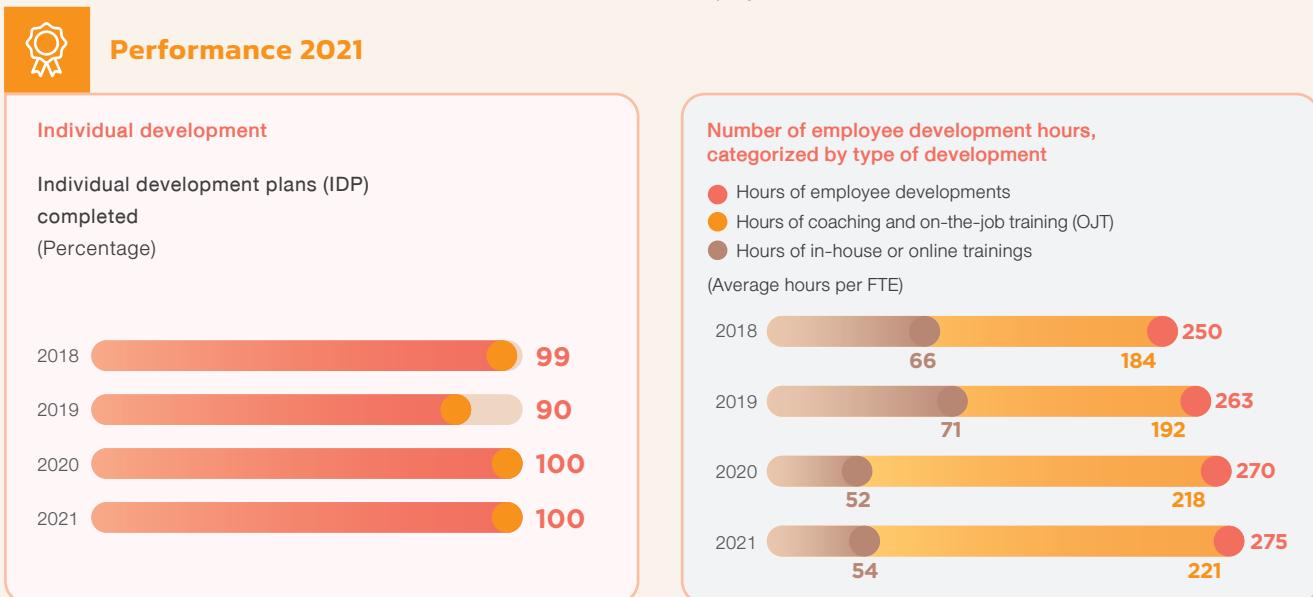


<b>3. Business Explorer Development</b>	Training, learning through simulation, and practical experience	This course trains employees to become strategic thinkers. Employees are taught to seek new opportunities to build new businesses for the organization and create added value. The course aligns with Thaioil's three business strategies and supports the Company's sustainable development.
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Leadership competency development is key to driving the organization and our people forward, and Thaioil Group has continued to place this at the forefront of our strategy. We have focused our efforts in ensuring that our leaders are ready to respond to changes, and that they can effectively lead their teams under uncertain conditions. Thaioil appointed the Empathetic Leadership Development in Action course for all employees at the unit head levels and above. This course builds leadership skills in "understanding, being accessible, and developing", and in the long term will help drive efficiency in teams, increase motivation and engagement between the organization and

employee engagement, and support our goal in being "The Best Employer".

Through adjusting our approach to human capital development to fit with current conditions, Thaioil was able to continue and maintain our employees' development. Employees continued to receive training that built their readiness in supporting Thaioil's future business expansion plans and strengthened their resilience to manage future challenges. In 2021, Thaioil invested a total of 506 million THB into human capital development, and employees on average received 275 hours of development and training per full time equivalents (FTE) of employees.





## Performance 2021



### Natural Capital



Performance in the PTT Group KM  
Maturity Assessment improved from level 3 to

**Level 4**



### Building a Positive Employee Experience (People Experience)

Thaioil Group values employee opinions and suggestions. To that end, we seek to gather insights from employees through a variety of channels, including direct communication channels with management executives, ongoing conversations between supervisors and employees, as well as the annual employee engagement survey. Findings gathered are used to complete an in-depth analysis. Results then inform the development of projects to promote employee well-being, satisfaction, and engagement from the first day of employment to their retirement.

#### Managing employee well-being through the 5 Happiness Project

To build a positive work experience for employees, we must support their well-being. The 5 Happiness Project illustrates Thaioil's commitment to support employee happiness in five areas, and serves to promote work-life balance amidst rising business challenges and the global COVID-19 pandemic.

**Happy Bodies (Health Meter)**

We promote employees' physical well-being through the Health Meter application, which presents analytics on physical health and provides recommendations on maintaining good physical health.

**Happy Hearts (Resilience Mind)**

We promote employees' mental health through supporting employees in managing stress from work. Employees can use the OOCA application to consult with mental health experts or psychiatrists at any time.

**Happy Wealth (Flexible Benefits)**

Through the Flexible Benefits initiative, we allow employees to exchange unused benefits for other benefits as they wish.

**Happy Networking (PM4U Connected)**

In the context of the 'new normal' life, we foster employee happiness and engagement throughout the organization through the 'SAP JAM' platform, which connects employees with similar interests and lifestyles. We believe this will contribute to good work relationships and a positive working community.

**Happy Appreciation (Admiration)**

Words of appreciation and thanks are ways to spread positive energy and create an enjoyable working environment. Through the Admire application, we promote a culture of appreciation in the organization.

#### COVID-19 Pandemic Management and Prevention

The I-COVID Center leads COVID-19 pandemic management and prevention in Thaioil Group. The Center is responsible for establishing safety measures and policies covering employees, subcontractors, as well as employees' families, to ensure safety and prevent business disruption resulting from infections in the operations. As a result, the Company established the control measures as follows:



Defined measures to prevent infection within the Company through prevention measures classified by colors



Enforced the work from home policy



Procured vaccines and supported employees, their families, and subcontractors in getting vaccinated



Conducted proactive COVID-19 testing with antigen test kits (ATK)



Organized an initiative to provide employees with financial support during the COVID-19 pandemic



Maintained ongoing communications with employees and encouraged them to act cautiously and responsibly, and follow measures to "limit, let go, and stop" participation in high risk activities and travels to high risk locations



Adopted bubble and seal measures (cluster, control, avoid business impacts)



Grouped employees according to their activities and clearly defined areas of work (clustering) for employees working on mission critical activities, and established a safe house for operators

## Increasing Employee Satisfaction and Engagement (Employee Satisfaction and Engagement)

Through the PEOPLE Model, Thaioil Group continuously organizes organizational activities to build employee engagement. At the same time, supervisors are encouraged to design activities that fit the needs of their teams. In this way, the Company responds to employee needs and expectations, and thus strengthen our ability to develop good relationships, build a positive working environment, and retain employees.



In 2021, Thaioil Group advanced our readiness to become "The Best Employer" through completing an in-depth analysis of the employee engagement survey. We also developed a manual called the "Care Package: Insightful Leader", which is designed for function leaders to use in communicating and creating correct understanding while maintaining evaluation. Through recommending and consulting and promoting career opportunities, and the TOP Fan Club, an activity to build organizational knowledge. Be that employee information, strategy, or investment in large projects, so that employees understand the strategy, business direction, an understand the

links with working and collaborating with international agencies to become shared goals.

Performance management is key to retaining talent. Thaioil Group reviews and develops tools to evaluate employee performance. We drive communications between supervisors and operators to ensure a mutual shared understanding. The Company builds supervisor capacity in understanding the performance management system so that supervisors across the organization have standardized practices, and that supervisors can communicate clearly and accurately to employees.



Please see more details on Thaioil Group's Performance Management System in the Company's website. To see the policy on the website, go to Thaioil's website, choose the "Sustainability" section, "I: Our Well-being", then "Employee". It is also directly available through this link: <https://www.thaioilgroup.com/home/content.aspx?id=161&lang=en>



## Performance 2021

The Company's management to enhance the positive experience of our employees has been hugely successful, as reflected in our performance on employee engagement, employee satisfaction, and turnover rates, all of which achieved our set targets. Notwithstanding, Thaioil remains committed to continuously improve our performance to advance employee engagement and satisfaction to achieve levels comparable with leading companies in Thailand.



### Human Capital

Employees received performance reviews

**100%** achieved the set target.

Employee voluntary turnover rate

**1.17%**

better than the target set at below 2.5

Employee engagement rate (Percentage)



Employee satisfaction rate (Percentage)



# CORPORATE SOCIAL RESPONSIBILITY



## CHALLENGES, RISKS, AND IMPACTS

In 2021, Thaioil Group faced challenges in implementing corporate social responsibility projects amidst the continued COVID-19 pandemic while maintaining stable operations, flexibility, and adaptability. This year, the Company completed a review of key targets in our environmental, social, and governance (ESG) strategic framework in order to reduce risks resulting from the changes we have observed over the past year – both before and during the outbreak of the COVID-19 pandemic – to maintain management within our organization and of impacts on the industry during lockdown measures. The Clean Fuel Project (CFP) in particular required due care for Thai and foreign employees and contractors to prevent infection within the operations. We have also taken action to care for communities surrounding our operations, for hospitals in the Chonburi Province area, and public health teams across the country, through promptly providing support for the purchase of tools and equipment needed to prevent COVID-19 infection.



## COMMITMENT AND TARGETS

Thaioil Group aspires to operate a petroleum and petrochemical refinery business under a framework of management excellence and in compliance with principles of good governance, while also upholding responsibility towards stakeholders, the environment, communities, and society, in order to be an organization that grows sustainably.

For 2022, Thaioil has planned integrated community development and designed projects and activities in culture, health and quality of life, education, and environment. The Company is also committed to “Empower Social Engagement through Sustainable Energy & Chemicals” while following our community, social, and environmental development framework, and systematically assessing program effectiveness through tools such as the social return on investment (SROI).



### Target 2022



**100%**

of community complaints were responded to, resolved, and resulted in measures to prevent recurrence



Community engagement score at



**85%**

or above



Strategic CSR projects have a social return on investment (SROI) of at least 2:1 (Every baht of investment generates a social return of 2 THB)



Please see more details on the Thaioil Group Corporate Social Responsibility Policy, Strategy, and other CSR activities on the Company's website. To access through the website, go to Thaioil's website, choose the “Sustainability” section, “WE : People's well-being”, then “Corporate Social Responsibility”. It is also directly available through this link: <https://www.thaioilgroup.com/home/content.aspx?id=163&lang=en>



## MANAGEMENT APPROACH

The Company has developed and established a policy and strategy for our work in corporate social responsibility. Results and performance are reported to the Corporate Governance Committee on a quarterly basis.

### Community Needs Assessment and Engagement

Thaioil Group conducts community relation activities with communities surrounding the refinery according to the “3-synchronization model” and the “5 Together” conceptual framework.



This approach ensures that communities are involved in community development activities, and serves to build community self-sufficiency and strength. Activities are categorized into four themes, comprising of social, religion, traditions, and culture; health; education; and environment. Thaioil adheres to the principle of holistic development, and has the following mechanisms to gain community inputs on their needs.



#### Synchronization Model Meeting:

Aside from ensuring that communities can access accurate and reliable information relating to the Company, the meeting also offers a ‘community speaking’ session. This session gives community representatives the opportunity to raise issues or feedback regarding Thaioil’s operations, enabling the Company to immediately look into and resolve the issue, and ultimately develop long-term solutions and preventive measures.



#### Community Feedback Sessions:

Thaioil has a mobile team that travels into communities to organize community feedback sessions. Community members that want more information or clarification on any of the Company’s projects can send a request to the head of the community committee. Then, Thaioil representatives will organize a visit to gather community members’ questions and feedback, take action as needed, and report outcomes back to the community.



#### Community Engagement Survey:

The Company hires an independent, third-party agency to conduct a community engagement survey. The survey covers topics related to community satisfaction with the community relations activities that the Company organizes alongside communities. Survey results are then analyzed and utilized to make further plans for the following years.



#### Online Activities:

To accommodate a variety of communication channels and adapt during the COVID-19 pandemic, Thaioil uses online channels to engage communities and various stakeholders, including community committees, volunteer groups, youth groups, school principals, and academic institutes that are part of our network. Community activities have also been adapted to be organized online.



#### Participatory Community Management in Clean Fuel Project (CFP) Construction:

Through community visits, the Company communicated to communities to ensure they are aware of and understand the type of construction activities taking place, and are engaged in the implementation of corrective actions during construction work. The Company also provided support to communities to manage potential impacts. Thus, activities were completed according to plan.





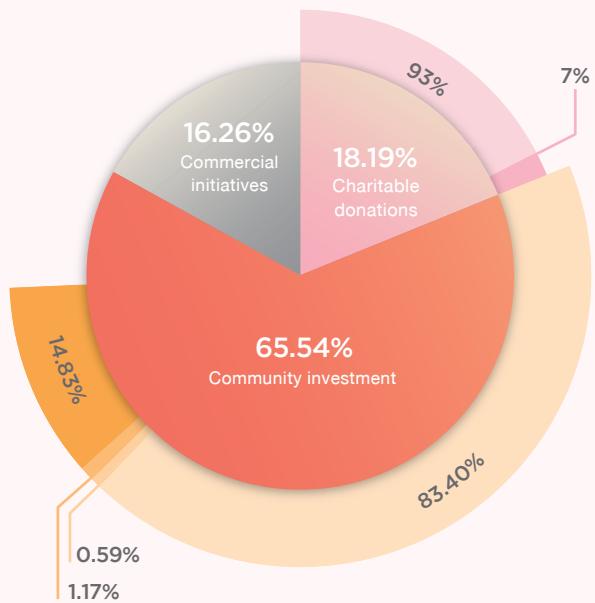
### Community Grievance Mechanisms:

Thaioil Group has a central office that provides 24-hour access to communities to report incidents or grievances. In the event of an incident, the office will coordinate with internal functions to reduce the severity of impact on communities, and resolve the root cause of the impact. The office uses the VOS (Voice of Stakeholders) Management system as the primary tool in collaborating and resolving submitted grievances.



### Performance 2021

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



#### Breakdown of Charitable Contributions

- Cash contributions 43.77 million THB
- In-kind giving 3.27 million THB

#### Breakdown of Community Investment

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

#### Input

Management overheads costs at approximately

**31** million THB

**1,457** employee volunteers together contributed a total of

**12,488** volunteer hours

Employee volunteering time valued at approximately

**5.12** million THB per year

Total social investment

**216** million THB

#### Output

**56** CSR projects and activities

**100** Beneficiary organizations

**131,375** individual beneficiaries

The Community Health and Learning Center had

**22,223** visits

#### Outcome

##### Social and Relationship Capital

In 2021, the community engagement survey completed by the third-party agency found that community engagement was

**96.74%**

which exceeds our target of 85% community engagement or above.

Overall, the Company achieved the 2:1 social return on investment target. For the Sustainable Energy for Health Care Project, the Company completed installation of an 80-kW rooftop solar power system for Laem Chabang Hospital in Sriracha District, Chonburi Province. The social return on investment of this Project, calculated for 25 years, is **5.2:1**

## Creating Social Value through Community and Social Development Projects

Priority	Education (SDG target 4.3)	Environmental Conservation (SDG target 13.1) (SDG target 13.3) (SDG target 15.2)	Energy and Natural Resource (SDG target 7.2)	Quality of Life (SDG target 3.8) (SDG target 8.3)
		 		 
Approach	Support education development initiatives in collaboration with academic institutions and award scholarships	Manage forest conservation and rehabilitation, and develop initiatives to reduce greenhouse gas emissions	Develop alternative energy options and promote efficient energy consumption	Support access to employment opportunities and promote public health for local communities
Target	<p><b>By 2023:</b></p> <ul style="list-style-type: none"> <li>Support skill development for more than 5,000 teachers and students in general education, English, science, sports, arts, and other subject areas</li> </ul>	<p><b>Support the net zero greenhouse gas emissions target by 2060:</b></p> <ul style="list-style-type: none"> <li>Support the transition to a low carbon society through forest rehabilitation, conservation, and growth, while creating balance in local ecosystems.</li> </ul>	<p><b>By 2023:</b></p> <ul style="list-style-type: none"> <li>Install solar power systems for 6 hospitals and medical centers.</li> </ul>	<p><b>By 2023:</b></p> <ul style="list-style-type: none"> <li>Organize more than 12 job training programs</li> <li>Over 300 local beneficiaries participate in job training programs</li> <li>Organize more than 10 activities to promote health</li> <li>Over 500 community members participate in health activities</li> </ul>
Social Value Created in 2021	<p><b>CONNECT ED Project</b></p> <ul style="list-style-type: none"> <li>Employed 56 teaching assistants for the 14 schools participating in the Restart Thailand Project</li> </ul> <p><b>Teach for Thailand Project</b></p> <ul style="list-style-type: none"> <li>Developed 2 changemaker teachers in Science and English</li> </ul>	<p><b>Project to Plant 200 Trees across 5 Rais</b></p> <ul style="list-style-type: none"> <li>Reduced 2 tons of carbon dioxide equivalents of greenhouse gas emissions</li> </ul>	<p><b>Sustainable Energy for Health Care Project</b></p> <ul style="list-style-type: none"> <li>Installed an 80-kW rooftop solar power system at Laem Chabang Hospital in Sriracha District, Chonburi Province, in effect helping the Hospital reduce electricity costs by approximately 400,000 THB per month</li> </ul>	<p><b>Additional Jobs for Increased Incomes Project: Year 3</b></p> <p>Organized 2 job training courses, attended by 36 community members, including:</p> <ul style="list-style-type: none"> <li>A baking course on no oven recipes, attended by 30 community members; and</li> <li>A product course for Laem Chabang communities, attended by 6 community members.</li> </ul> <p><b>Dental Health Project</b></p> <ul style="list-style-type: none"> <li>Supported community members' annual dental costs (813,500 THB in total), with 1,091 community members receiving dental care services</li> </ul>
Business Value Created in 2021	<ul style="list-style-type: none"> <li>Generated a total of 81 million THB of benefits to corporate reputation (PR value) from social development projects</li> <li>Created corporate volunteering culture in contributing back to society. A total of 1,457 Thaioil Group employees volunteered 12,488 hours to help with 56 CSR activities</li> </ul>			

## Highlighted CSR Projects in 2021, Categorized by CSR Framework Priority Area

### Community Management

#### Community Health Check-Ups



##### Objectives:

1. To survey community health and implement health projects alongside government agencies and academic institutions
2. To share data on new patients and patients at home to government agencies responsible for continuing patient care

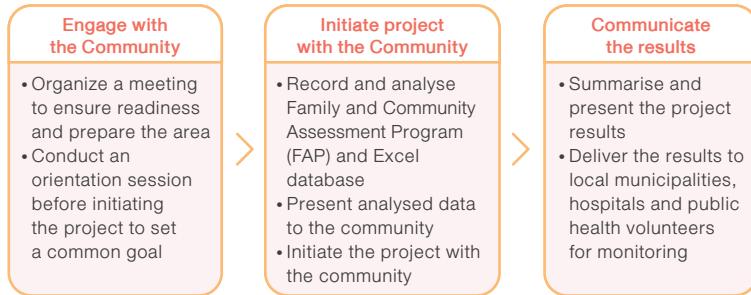
##### Priority Area: Quality of Life



##### Background:

The Family Health Survey Project is a collaboration between fourth-year students from the Faculty of Nursing of Burapha University (three classes in total with 16 students in each class), the Laem Chabang Hospital, Laem Chabang Municipality, the village health volunteers at Baan Chak Yai Jeen community, and Thaioil Group. The Project aims to assess the health status of communities and identify root causes of observed health issues. Then, through a participatory process with communities, the Project will prioritize the health issues based on its perceived importance. Prioritized issues are then further analyzed, with results informing the development of health projects in the area.

##### Approach:



##### Performance 2021:

1. Completed visits to Baan Chak Yai Jeen Community and established a database of information on health status and patient data. The database is recorded in the FAP and sent to government agencies in the area.
2. Organized a public participation session to report findings to communities and organize initiatives to promote community health with the village health volunteers and government agencies in the area.
3. Village health volunteers learned about promoting community health.

Timeframe	Number of households	Number of citizens surveyed	Health Project
First Round 26 <sup>th</sup> October – 14 <sup>th</sup> November 2020	193	603	1. Preventing Diabetes and High Blood Pressure in Chak Yai Jeen Project 2. Baan Chak Yai Jeen Community – Exercise for All Ages Project
Second Round 8 <sup>th</sup> – 28 <sup>th</sup> December 2020	200	443	1. Chak Yai Jeen Bids Farewell to Cockroaches Project 2. Baan Chak Yai Jeen – Together We Defeat “Mosquitoes Project”
Third Round 22 <sup>nd</sup> March – 9 <sup>th</sup> April 2021	161	508	1. Ao Preuksa - Reduce Risks, Reduce Disease Project

## Online Community Engagement



### Objectives:

To ensure that community members continue to receive updates from the Company, and can benefit from Thaioil Group's training programs

### Priority Area: Education and Quality of Life



### Background:

Background: As the COVID-19 pandemic continued throughout 2021, Thaioil Group adapted community activities and organized them online in order to minimize infection risks and comply with government control measures. Furthermore, this supported a wider variety of community engagement channels.

### Approach:

1. Communicating with Communities: Thaioil organized online meetings with community committees, local government agencies, and village health volunteers to share Company updates, gather community feedback and opinions, and organize community relationship building activities.
2. Building Relationships with Different Community Groups: Thaioil organized relationship building activities with youth groups and general citizen groups from the 10 communities living around our area of operations.

### Performance 2021:

Activities	Number of beneficiaries
Thaioil Sharing: In this activity, the Company helped students from communities living around the refinery prepare to transition to working life with confidence.	70
Online English Lessons	30 per lesson (A total of 8 lessons)
Online Buddhist Chants for Calm Hearts Sessions	50 per session (A total of 64 sessions)
Health Talks: "Thaioil Group Live for Life – Maintaining Health While Socially Distancing"	50 per session (A total of 8 sessions)
The "Towards Number One: Thaioil Group Supports Youth Dreams in Futsal and Football Project" organized in collaboration with the "Free Fire Bluewave Chonburi Futsal Club" and the "PTT Academy's Football Association"	100

## Sustainable Energy for Health Care Project



### Objectives:

To enhance energy security for Hospitals; promote efficiency in public medical services for the benefit of citizens; reduce greenhouse gas emissions; reduce hospital expenses; and support hospitals in making use of the cost savings to develop other projects to increase energy efficiency and conserve energy (Advanced Energy Efficiency), covering the maintenance costs of solar panels and initiating other projects for the benefit of communities and society.

**Priority Areas:** Environment, Energy, and Quality of Life



### Background

Thaioil completed installation of an 80.24-kW rooftop solar power system on the new Emergency and Accident Building of Laem Cabang Hospital in Sriracha District, Chonburi Province and handed it over to the Hospital in a ceremony.

### Performance 2021:

The installation was completed in March 2021. The solar power system has the capacity to conserve energy at approximately 89,000 kilowatt-hours per year, which is equivalent to greenhouse gas reductions of 60 tons of carbon dioxide per year. The system will also help the hospital save 400,000 THB per year. Cost savings from the electricity will be used to cover:

- Maintenance costs for the solar power system;
- Costs to treat the Hospital's wastewater and reuse it at the Thaioil 60-Year Park; and
- Costs to purchase equipment to help in-patients and patients with disabilities.

The social return on investment (SROI) of this project is 5.2:1 (Each baht of investment delivers a return of 5.2 THB in social value.)

## Smart Farming Project



### Objectives:

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

### Approach:

The Smart Farming Project is implemented in collaboration with government agencies, universities, and community enterprises in target areas. Currently, the Project is being implemented in three locations, as listed below.

- The Community Capital Learning Center at Tha Chang Sub-District, Sawang Wirawong District, Ubon Ratchathani Province: A collaboration between Ubon Bioethanol Company Limited – a Thaioil Group subsidiary – and the Provincial Community Development Office of Ubon Ratchathani to farm and process gotu kola, and sell the product through the Tha Chang Noi Organic Farmers Group Community Enterprise.
- Bang Phra Sub-District, Sriracha District, Chonburi Province: A collaboration between Thaioil, Bang Phra Sub District Administration Organization, and Rajamangala University of Technology Tawan-ok Bang Phra Campus to grow salad greens and garden vegetables with the Thai Ratchamongkol Farming Community Enterprise.

**Priority Area: Quality of Life**

- Chonburi Central Prison, Khlong Kiu Sub-District, Ban Bueng District, Chonburi Province: A collaboration between Thaioil, PTT Public Company Limited, and Chonburi Central Prison to work with prisoners who are about to get released to grow salad greens and garden vegetables. After their release, these individuals can then also apply the skills they learned from this activity to support their livelihoods.

**Performance 2021:**

The Project hired nine recent graduates from the Restart Thailand Project – which aims to support government policy to reduce unemployment rates during the COVID-19 pandemic – to act as project development officers for the three locations. In 2021, the Project completed installation of smart greenhouses in all three locations. These smart greenhouses are equipped with automatic irrigation systems, air filtration systems, and soil moisture sensors.

**Projects to Cultivate an Employee Voluntary Culture****The “You Initiate...We Fulfill” Project****Background:**

Employees are the heart of any organization, and hold the expertise and accumulated experience necessary to drive operations. At the same time, employees are also the ones who put our values into practice. “Volunteerism” is a key value for Thaioil. The 60-Year Thaioil Volunteer “You Initiate...We Fulfill” Project was then initiated in November 2020 to mark Thaioil’s 60<sup>th</sup> anniversary.

**Approach:**

Employees were encouraged to initiate their own volunteer activities between November 2020 – July 2021, and record their actions on the Thaioil Hub Application. The Company will then turn these activities into financial donations and distribute to five different charitable organizations.

**Performance 2021:**

Throughout the nine months of project implementation, 600 employees participated in the project and posted 1,600 social media posts. This was converted to 1.3 million THB worth of donations, which were given to the following organizations.

- The Thammarak Foundation (Wat Prabatnampu) at Mueang District in Lopburi Province received 400,000 THB.
- The Pattaya Orphanage at Bang Lamung District in Chonburi Province received 300,000 THB.
- The Karunyawet Home for Persons with Disabilities Protection and Development at Bang Lamung District in Chonburi Province received 200,000 THB.
- The Watthana Niwat Foundation for the Elderly at Paknam in Mueang District in Samut Prakan Province received 200,000 THB.
- The Teacher Boonchoo Home for Special Children at Sattahip District in Chonburi Province received 200,000 THB.

**Priority Area: Quality of Life**

News Coverage: Thaioil kickstarts the “You Initiate... We Fulfill” Project to promote a volunteer culture in the organization. Time 02:24 minutes, ONE 31 Channel News, 24<sup>th</sup> November 2020



News Coverage: The “You Initiate ...We Fulfill” Project concludes with 1.3 million THB of donation raised. Time 02:47 minutes, Bangkok Biz News, 2nd September 2021

## CSR Networking and Branding

### The “Contributing Energy, Empowering Vaccination” Project



#### Background:

As the COVID-19 pandemic spread with speed and intensity, Thailand saw a sharp increase in infected cases in the past year. Healthcare workers at the frontlines have been pushed to their very limits in this crisis. Thaioil has contributed to energy security over the past sixty years, and during this crisis remains determined to develop communities' quality of life and support the realization of a better future. To that end, we have organized the “Contributing Energy, Empowering Vaccination” Project.

#### Objectives:

To provide fuel and cleaning chemicals to public health agencies, support the distribution of vaccines to citizens, and assist in efficiently delivering or transporting medical equipment.

#### Priority Area: Quality of Life



#### Performance 2021:

To support efforts to vaccinate citizens against the COVID-19 virus, the Company donated the Group's fuel and cleaning chemical products to public health agencies, including:

- Central government agencies with activities across the country: Ministry of Public Health, Department of Health, Thai Red Cross Society, Siriraj Hospital, Chulalongkorn Hospital
- Local government agencies: The Company helped open a vaccination center at Ao Udom Community Center, and donated fuel products to public health teams in Sriracha District and Chonburi Province.
- Collaboration with PTT Group: The Company donated fuel to 13 provinces and helped set up screening units and end-to-end field hospitals.
- Public health teams: The Company donated medical equipment and products to medical teams in Chonburi Province and across Thailand throughout the various COVID-19 waves. Examples of medical equipment and products donated include: nasal cannula machines, personal protective equipment (PPE), gel and liquid alcohol for cleaning, N95 masks, face shields, standing temperature scanners, as well as other essential items for field hospitals.



News Coverage: Thaioil “Contributing Energy, Empowering Vaccination” and Helps Thais Survive the Pandemic  
Time 04:37 minutes, Thansettakij Online, 30th June 2021

## CSR Projects in 2021, categorized by CSR Framework

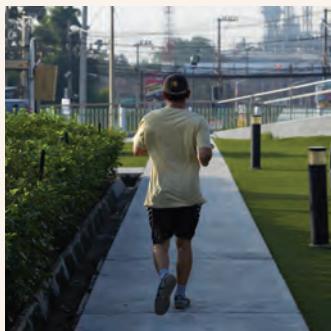
### Quality of Life



#### Dental Health Promotion Project for Schools Around Thaioil Group

The Company provides dental services to primary school students in Grades 1 to 6 in eight schools located around the refinery. However, the COVID-19 pandemic resulted in the closure of schools and a shift to online learning. The Company was then only able to provide services for the first four months of 2021 and covered 1,091 students.





### The 555 Together We Run Happy Steps Project at the Health Center (Organized as a virtual event)

The Company invited communities surrounding Thaioil Group to exercise by walking and running for 5 kilometers at 5 PM on Thursdays at the Health Center. During the COVID-19 pandemic, participants can still join this activity, record their kilometers, and receive activity updates through the "Thaioil Group Live for Life – Maintaining Health While Socially Distancing" health talks.



### Project to Support Victims of Natural Disasters

- The Company donated 5,000 liters of firefighting foam to the Disaster Prevention and Mitigation Provincial Office of Samut Prakan Province and delivered 500 care packages to those affected by the chemical plant fire at Samut Prakan Province.
- The Company donated 1,600 care packages and sent employee volunteers of the PTT Group SEALS unit to help communities who were affected by the Tian Mu storm. The Company directly supported over 1,000 households across four provinces.
- The Company donated over 2,000 blankets to the Ban Mae Long Luang Sub-District Health Promoting Hospital at Omkoi District, Chiang Mai Province, as part of the "Thaioil Refines Warmth to Battle the Cold Project".



### Laem Chabang Youth Training for Jump Rope Championship Project

Four youth representatives from the Thaioil Jump Rope team were selected to join the Thailand National Jump Rope Team and compete internationally at the International Rope Jumping Union (IRJU) 2021 Virtual World Championships organized by the IRJU.

Quality of Life and Development of Volunteerism	Quality of Life	Environment and Resource Efficiency	
<b>Thaioil 60<sup>th</sup> Charity Virtual Run 2021</b> <p>The activity was organized for 60 days between March 17<sup>th</sup>, 2021 – August 15<sup>th</sup>, 2021. The run was participated by 2,930 runners, who together raised a total of 2.2 million THB of donations.</p>	<b>Community Economic Support Project</b> <p>The project continued to support employment and incomes for the ten communities surrounding the refinery for the third year. A "Laem Chabang Community Products by Thaioil Group" vocational group was founded with six initial members.</p>	<b>Thaioil CE WE GO Project: Promoting Circular Economy Values</b> <p>Employees were encouraged to conserve water and energy, and sort their waste. The Company also organized color-coded waste bins, recycled food waste to create fertilizer, and upcycled plastic bottles to produce 1,600 employee shirts.</p>	
<b>Quality of Life and Environment</b> 	<b>Environmental Conservation Activities on the Occasion of the Death Anniversary of His Majesty the King Rama IX</b> <p>The Company, together with the committee representing the network of ten communities located around Thaioil Group, the Laem Chabang Municipality Manager, and Clean Fuel Project subcontractors, planted trees across a 5-rai area and released 9,999,999 marine animals back to the ocean. These included blue crabs, cuttlefish, turtles and banana shrimp that the fishery group has been breeding.</p>	<b>The Thaioil 60-Year Park Project</b> <p>The Company is working with the Laem Chabang Municipality to develop a 6-rai public park that will demonstrate a model of energy and environmental conservation. The park is expected to be completed by mid-2022, and will be located around the Ao Udom Community Center.</p>	

# Ensure Good Governance and Business Resilience



Maintaining trust in good corporate governance and transparency within the organization in order to strengthen the business and move towards sustainability



**>80%**  
of strategic suppliers that have been assessed on ESG risks, covering all suppliers for product and service types



The Ensure Good Governance and Business Resilience strategy guides Thaioil in maintaining organizational transparency through an effective governance management system. This entails communicating a clear tone from the top, strengthening internal systems, and balancing control with efficiency to ensure that all business activities across Thaioil Group's supply chain are transparent, fair, and can be monitored. This strategy also supports business growth and strength through incorporating digital technologies in work processes, building capacity for suppliers and business partners, innovating environmentally friendly products through research and development, and running our business ethically while aspiring to meet sustainability goals.

# FIGHT AGAINST CORRUPTION



## CHALLENGES, RISKS, AND IMPACTS

Thaioil Group is currently facing with various challenges in running our business, such as the COVID-19 global pandemic, the impact of climate change that drives organizations to become a net zero greenhouse gas emissions organization, business transformation and expansion to international markets, and striving towards a transparent organization. Henceforth, we must maintain balance between building on our strong business foundation and sustainability, operate our business transparently and comply with regulatory requirements, while ensuring stakeholders' best interests are equally accounted.

Furthermore, the Company has observed major changes and increased stringency in corporate governance regulations. Having effective corporate governance measures to prevent unethical practices is as important as ever, and a key part of this is the fight against corruption. Thaioil is duly aware that corruption greatly undermines sustainable development in all issues, whether that be business, economic, or social. We recognize that corruption can occur anywhere and at any time, and can take different forms and create varying levels of impact.



## COMMITMENT AND TARGETS

Thaioil's Board of Directors and executives acknowledge the importance of securing good corporate governance and fighting against corruption, which may obstruct the company's ability to achieve its corporate goal of being a 100th year sustainable organization that embodies a business culture of transparency. To meet this imperative, the Company has established and disclosed the Anti-Corruption Policy, which specifies roles, responsibilities, guidelines, and measures to fight against corruption. The Policy has been announced throughout the Company, with an explicit statement declaring that:

*The Board, the management, and employees must not corrupt nor accept corruption of all forms in any circumstances, covering the business of the Company in every country and in every relevant agency.*

*The Company defines guidelines, operating measures, and roles and duties of responsible persons, as well as regularly monitoring and reviewing the implementation of the anti-corruption policy in compliance with changes in businesses, rules, regulations, and relevant laws.*

Thaioil is committed to maintaining the confidence of our investors and all other stakeholders while increasing business competitiveness and pursuing sustainable development. To that end, we align our management approach with good practices in corporate governance and business ethics. Informed by GRC (governance, risk, and compliance) principles, the Company's management approach integrates principles of

good corporate governance, risk management, and oversight to ensure regulatory compliance. The system is driven by people, processes, and technology, and serves to ensure that Thaioil's business is efficient, transparent, and accountable.

Thaioil's Corporate Governance Policy, Anti-Corruption Policy, and other policies and guidelines related to stakeholder treatment are reported in the Annual Report (Form 56-1 One Report) under the "Corporate Governance Policy" section and the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=234&lang=en>

As of 2021, Thaioil is in the process of reviewing the Anti-Corruption Policy to assess its alignment with rules and regulations, public announcements, good corporate governance guidelines shared by regulators (SET and SEC), and corporate governance standards and assessment criteria recently updated

to include fraud and anti-corruption policy. Meanwhile, for the Corporate Governance Policy, the Company has completed the review and found that there were no significant changes in standards of practice. The Company's policy remains in alignment with expectations.



## MANAGEMENT APPROACH

### Assessing corruption risks

Thaioil gives importance to managing risks across the organization. To that end, the Board of Directors has assigned the Risk Management Committee as the governing body responsible for establishing risk management policies for the organization and for overseeing the risk management systems and processes in the organizational, business unit, and functional levels, to reduce impacts on the business and ensure the achievement of corporate goals.

Thaioil has developed risk management plans that include the assessment, analysis, and review of risks with consideration to business plans. This process covers both internal and external risks, such as national political risks, global economic risks, legal and regulatory risks, and risks related to stakeholder expectations. The Company uses a risk appetite framework that covers seven areas, including: performance and investment; compliance; safety, occupational health, and environment; reputation; fraud and corruption; information and communication technology (ICT) security; and Clean Fuel Project (CFP) investment. To monitor the implementation of these risk management measures, Thaioil has defined key risk indicators (KRIs) that measure and monitor the performance of relevant functions and the organization against set targets. Moreover, relevant risks and mitigation measures are regularly reported to the Risk Management Steering Committee, Risk Management Committee, Audit Committee, and the Board of Directors.

Furthermore, Thaioil has established a working team to drive the integration of GRC principles throughout Thaioil Group. This team will be responsible for ensuring that functions across the organization efficiently and systematically implement management measures for good corporate governance, risk management, internal controls, and compliance with rules, regulations, and organizational policy.

Following the assessment of corporate governance and corruption risks, Thaioil regularly reviews the corporate risk management plan related to corruption. For the past year, we found that the plan is still up to date and no key changes were needed. The Corruption Risk Profile had identified that corruption risks were presented in three activities, including seeking permits from government agencies, tax fraud, and procurement processes. The Company has assigned mitigation measures for these activities.

In 2021, Thaioil conducted business while maintaining compliance with rules, regulations, and requirements of government and regulatory agencies. We received no complaint of misconduct or action that might be related to corruption.



**Promoting an internal corporate governance, and establishing a good public reputation in corporate governance and anti-corruption**

**Promoting REACT+E principles and corporate POSITIVE values**

In honor of our commitment to manage our business with a strong foundation on fairness, integrity, transparency, and accountability, in alignment with international standards on good corporate governance, Thaioil has developed a list of corporate values – abbreviated as POSITIVE – for all our employees to apply in their daily duties and responsibilities. The “I” in POSITIVE stands for integrity, and represents our commitment to operate with honesty and fairness. We have also consulted best practices in Thailand and abroad to develop frameworks and mechanisms that can support good corporate governance practices in our operations that reflect the key principles of “REACT+E” in the corporate governance of Thaioil. We continuously encourage employees at all levels to do their work with honesty and integrity, inspire in them consciousness, and promote compliance with the code of conduct. Details of the organizational culture are shown below:

R	E	A	C	T	+ E
Responsibility	Equitable Treatment	Accountability	Creation of Long Term Value	Transparency	Ethics
Responsibility for performing duties with competence and adequate efficiency	Equal and fair treatment of all stakeholders	Accountability for one's own decision-making and acts, as well as those of others under one's responsibility, including the ability to justify and explain that decision	A vision to create value for the organization in the long-term	Transparency in conducting business, openness to scrutiny, and transparent disclosure of corporate information to related practices	Ethics and morality in conducting business

Thaioil recognizes that neglecting or failing to fulfil our duties in complying with laws, regulations, corporate values, corporate governance principles, and code of conduct will undermine the confidence of our stakeholders, and create misinterpretation regarding the Company's corporate governance processes that impact the Company in the short and long term. For this reason, Thaioil places great importance to raise awareness both internally and externally through publishing policies and guidelines and communicating to relevant agencies external to the organization to reiterate the importance of following the rules and regulations with integrity, and to ensure the Board, executives, and all employees will not neglect or fail to comply with policies and practices.

**Collaborating with other partners to fight against corruption**

Since 2010, Thaioil has been a member of the United Nations Global Compact (UNGC). We have applied the 10 UNGC Principles that promote good governance regarding human rights, labour, environment, and anti-corruption in our working processes. Furthermore, the Company has also been a member of the Thailand's Private Sector Collective Action Coalition against Corruption, or the CAC, since 2012. In 2014, the Company became a CAC Certified Company for the first time with a membership term of approximately three years. The certification was renewed and the Company obtained the CAC Re-Certified Company status again in 2017 and 2020. Our participation in this program has contributed to significant advancements in developing and improving our practices towards greater transparency and uplifting corporate governance standards, as well as reducing the regulatory risks of being prosecuted under the Anti-Corruption Act 2018. Furthermore, our membership and continuous active participation in activities – such as the Anti-Corruption Day – demonstrates our commitment to fight against all forms of corruption.

In 2021, Thaioil contributed to the expansion of the anti-corruption network while also supporting our goal of creating a business value chain that is transparent, fair, and free of bribery. TOP Solvent Company Limited, a Thaioil Group Company, became a CAC Certified Company in Quarter 1 of 2021.

## Implementing initiatives to promote awareness and understanding of corporate governance and anti-corruption



In 2021, Thaioil continued to embed good corporate governance practices in our business, from our policies to our practices, to develop and strengthen the organizational corporate governance system and ensure compliance, transparency, and business integrity.

Listed below are some of the initiatives completed throughout the reporting year.

Organized a variety of activities for Thaioil Group employees, including the CG Work from Home activity – an online activity that promoted awareness of the importance of corporate governance – and the CG Inspiration Sharing Contest – a contest for employees to submit three words, or a motto, about corporate governance.

Surveyed and assessed employee awareness and understanding of corporate governance and business ethics through the 2021 CG Survey. The Company analysed the results of this survey and planned future activities to promote good corporate governance and business ethics in the organizational culture based on the findings of the survey.

Participated with other PTT Group companies in organizing the PTT Group CG Day 2021 event. This year, the chosen theme was “The Power of Business Integrity” and the purpose was to demonstrate a commitment to driving organizational success while complying with business ethics, and to recognize the importance of business ethics in remaining competitive. The event was well attended, with event attendees including the Board, executives, employees, representatives from suppliers and business partners, and guests from regulatory agencies such as the Stock Exchange of Thailand, Thai Institute of Directors, and the National Anti-Corruption Commission.

Cultivated employee integrity and promoted transparent, fair, and accountable work practices through training employees on these issues from the very first day they start working with the Company. The employee orientation program includes e-learning courses on corporate governance, business ethics, anti-corruption, and regulatory compliance which all new employees complete.

Organized the SRM Seminar 2021 for suppliers through virtual format, and communicated the Company's policies and guidelines related to corporate governance, anti-corruption, and human rights, and encouraged suppliers to join the SME CAC Certification through a video.

Communicated the No Gift Policy to all employees through internal communication channels. We also sent out copies of the “Request letter to avoid giving gifts to executives and employees of Thaioil Group” to our suppliers, customers, financial institutions, and other business partners. We believe that these efforts should help reduce behavior that is not in line with our Anti-Corruption Policy, and will promote the equitable treatment of all stakeholders.

Besides these initiatives, the Company also continued to regularly share information and updates on corporate governance, business ethics, and anti-corruption throughout the year through internal communication channels – e.g., the GRC Corner in the “Akanee” magazine (the primary corporate magazine circulated internally) and the CG E-Newsletter. Over the past year, the Company provided information and updates on these topics for a total of 14 times.

Communicated the Corporate Governance Policy, Anti-Corruption Policy, and Whistle-Blowing Policy through the TOP Way of Conduct Manual to ensure that all Thaioil Group companies refer to the same standards in their corporate governance systems and that practices are standardized across the Group.



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

Thaioil has established a complaint channel and whistle-blowing procedure to receive complaints from stakeholders who have been affected or risk being affected by the Company's business activities, and/or complaints regarding the acts of Directors, management executives, and employees that are illegal, non-compliant with business ethics, or might lead to corruption. Those who have been violated or affected by the Company's activities, as well as stakeholders, employees, related officers, and external individuals who have witnessed or possess knowledge of the act, can submit a complaint through determined channels. Details are listed in the Whistle-Blowing Measures section in the Corporate Governance Manual, available on the Company's website: <https://www.thaioilgroup.com/home/content.aspx?id=29&lang=en>

Additionally, Thaioil has established fair and adequate protection measures for the complainant, whistle-blower, or the relevant individual. This means that the individual is protected from retaliation, such as job reassignment, threats, harassment in the workplace, termination, or any other unfair treatment. Thaioil will maintain the confidentiality of information related to the complaint and will not disclose this information to any irrelevant personnel, unless it is necessary by law.

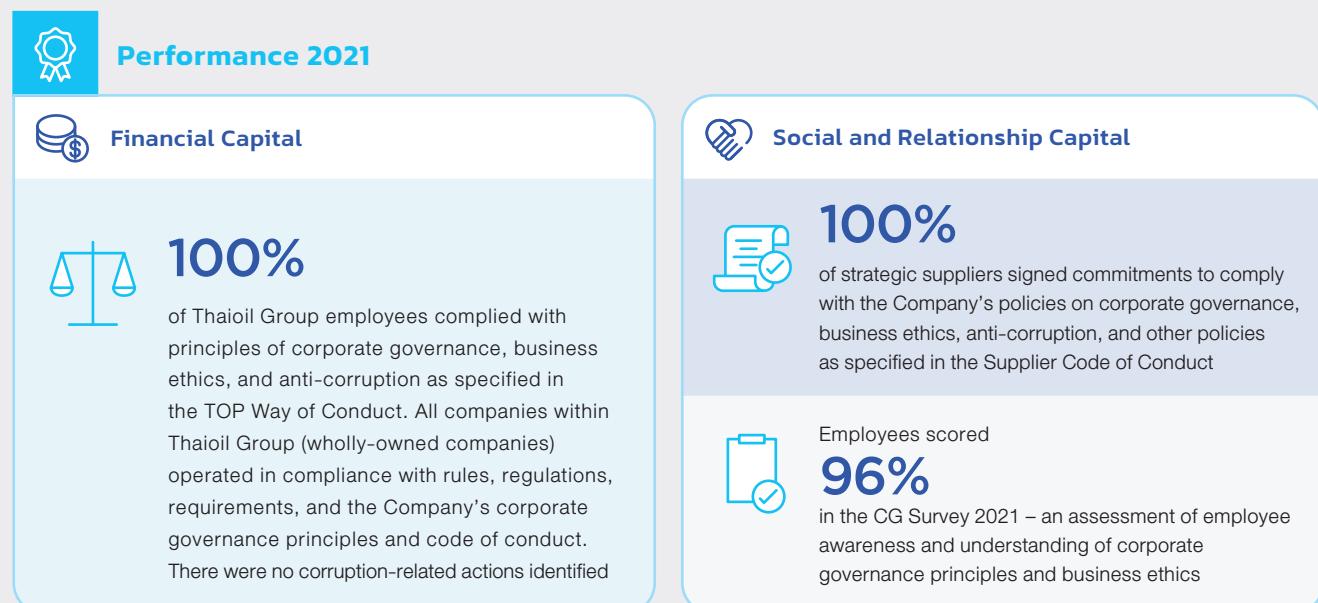
Thaioil regularly reviews and monitors performance related to complaint management in order to improve the efficiency of our working processes and complaint response. In 2021, Thaioil received one complaint through the Company's complaint and whistle-blowing channels. The Company completed an initial screening of the complaint, as specified in the Company complaint and whistle-blowing procedure, and found that the complaint met the criteria to be counted as official complaint. The Company then completed a full investigation of the complaint and found that there was no bribery or violation of Company rules. The results have been communicated to the complainant and the complaint was closed.

The complaints investigated can be categorized as shown below

Type of complaint	Number of cases investigated	Number of cases confirmed as breach or non-compliance
 Corruption and bribery	0	0
 Discrimination	0	0
 Confidentiality of information and Use of Inside Information	0	0
 Conflicts of interest	0	0
 Anti-trust / Anti-competitive practices	0	0
 Money-laundering	0	0
 Quality, Security, Safety, Occupational Health and Environment	0	0
 Non-compliance with the Company's regulations	0	0
 Other issues of Code of conduct	1	0

## Preventing conflicts of interest

Thaioil requires all employees to report conflicts of interest through the Conflict of Interest Disclosure Electronic System every year. This platform serves as a channel to monitor conflicts of interest in the organization. In 2021, 100% of our employees completed the annual conflict of interest form. There were two reported cases of potential conflicts of interest. However, after these cases were investigated, it was found that none of them posed conflicts of interest with Thaioil's business activities.



# DIGITAL TRANSFORMATION



## CHALLENGES, RISKS, AND IMPACTS

In response to the Thailand 4.0 policies of the government and PTT Group, Thaioil Group started developing a Digital Transformation Roadmap in 2017. We are conscious of the challenges facing our business as we confront with a rapidly evolving business context. At the same time, we are aware that these challenges are opportunities to improve operational efficiency and increase competitive advantage.

The Company sees great potential in applying digital technology across activities in the value chain – from crude oil sourcing, sales, production processes, human capital development, to data collection and management – to increase competitive advantage. We have developed agile projects to create new user experiences with a digital ecosystem and continue to promote safe and balanced use of technology. These efforts together help build organizational agility and employee engagement.

Moreover, The Company recognizes the value and importance of big data in industry. We have established a data management and government system to oversee data use in the organization, and integrated a centralized data platform to enable data analysis and performance enhancement that will help maximize benefits for Thaioil in the present and future. At the same time, we are conscious of the increased risks in cyber-attacks and cybersecurity that come with increased digitization of information. Thus, the Company has prioritized this issue to make certain that all data will be safely stored and to protect the organization from cyber incidents that may affect the business operations of Thaioil Group and the trust of our stakeholders.

Since 2020, the COVID-19 pandemic has contributed to the speeding up of digitalization in the Company. To align with all relevant stakeholders' operations under "new normal" conditions, Thaioil Group established additional measures to enable digital transformation and ensure cybersecurity.



## COMMITMENT AND TARGETS

Thaioil Group is committed to advancing digital transformation in all business activities in the value chain to enable improvements in competitive advantage while ensuring cybersecurity. We have announced a Digital Technology and Communication Policy and a Cyber Security Policy, which both apply to the entire Company (see more details on our Company website: <https://www.thaioilgroup.com/home/content.aspx?id=580&lang=en>), and developed a digital master plan which includes measures to ensure compliance with the Cybersecurity Act B.E. 2562 (2019), the Personal Data Protection Act, B.E. 2562 (2019) (PDPA), and other relevant regulations.



Target 2021

### Zero

cyberattacks that result in business impact  
(Zero Damage to Business)



## MANAGEMENT APPROACH

Thaioil Group established the Thaioil Group Digital Committee and the Cyber Emergency Response Team (CERT) to supervise and drive effective implementation of digital and cybersecurity management in the organization, and appointed staff with relevant expertise to oversee cyber management throughout both management and operational levels. We have completed a ransomware assessment and developed a playbook with established measures to ensure effective response. In 2022, we plan to complete exercises with an external consultant and management to test out the playbook in action. Performance is regularly reported to management executives, including reporting of information security and cybersecurity risk management to the Risk Management Committee.

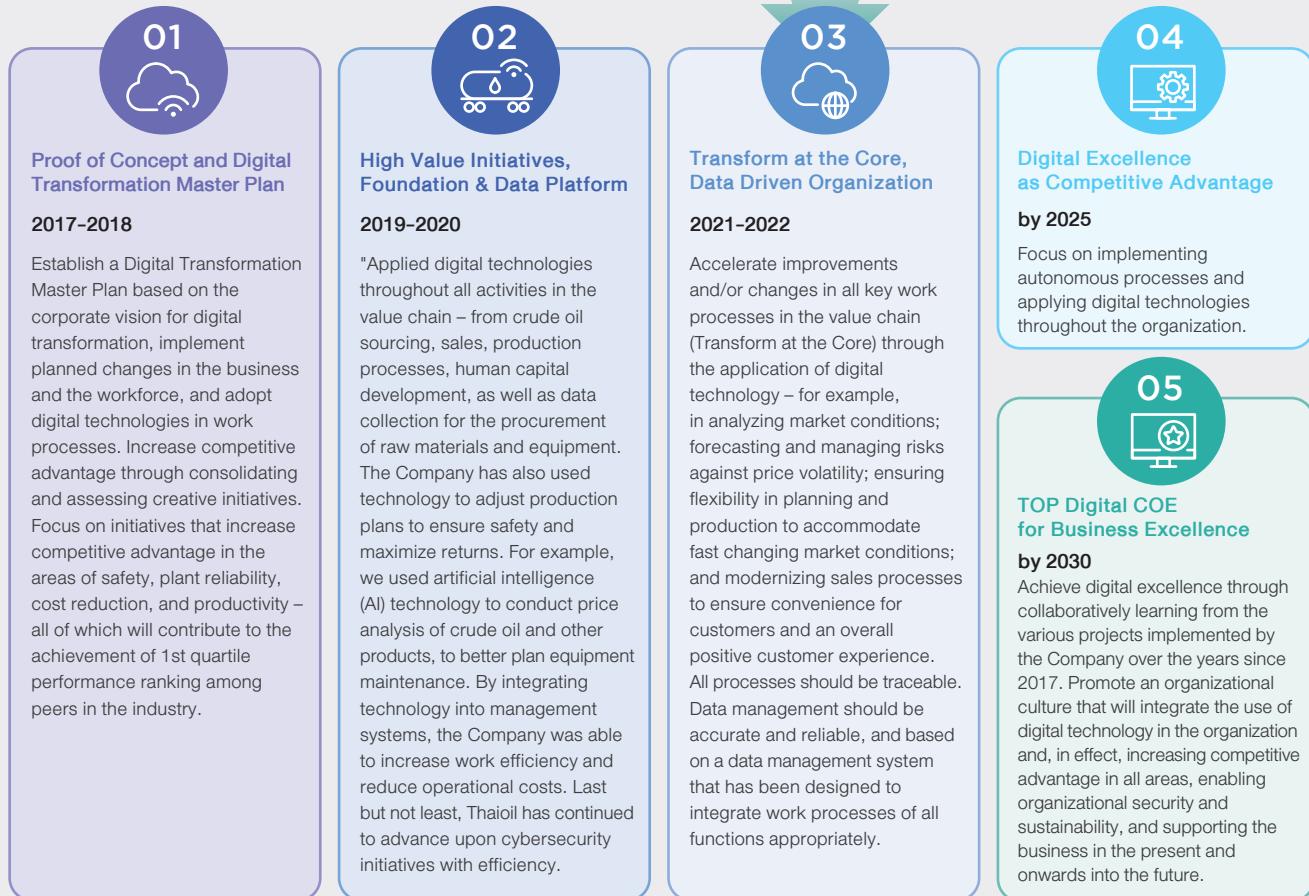
In 2021, the Company reviewed and updated organizational policy and protocol for information and communication technology. An enterprise architecture was built to map out links between the business and the application of digital technology.

This will inform the Company in planning improvement actions for relevant programs and systems.

Furthermore, Thaioil hired an external consultant to assess cyber security gaps across the organization and completely closed the recommended gaps in the cyber security system accordingly. We have implemented the security operating center (SOC), which is responsible for maintaining 24-hour monitoring of cybersecurity risks and organizing annual cybersecurity emergency drills to ensure organizational readiness in responding to emerging risks. Nonetheless, despite implementing various measures, we are aware that cyber threats, such as phishing emails and websites and database hacking, remain and may still cause damage to the organization. Thus, Thaioil is committed to a process of ongoing improvement and will continue to strengthen our organizational systems and increase employee readiness – whether that be through training and/or raising cyber risk awareness activities – to reduce the risks of such cyber-attacks succeeding and creating impacts on our business activities.

Building on the Digital Master Plan, Thaioil developed a long-term Digital Transformation Roadmap that outlines our plans until 2030. The Roadmap is grouped into five main phases, as presented below:

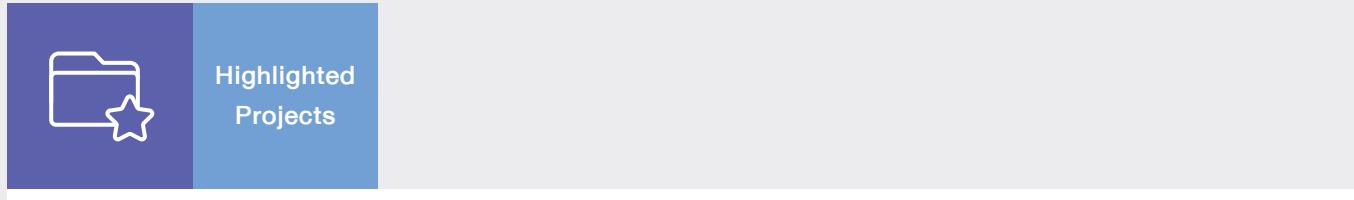
### Digital Transformation Roadmap



The Company monitors project progress and reviews the workplan regularly every year to ensure that the application of digital technologies in work processes align with business targets at the time and in the context of rapidly changing external conditions.

### Meeting IT Service Standards for Organizations in the Digital Age

Thaioil recognizes that managing IT service standards to meet expected standards is critical to enabling the business to achieve efficiency. We have made improvements to current service standards within the organization to align with the requirements of ISO 20000 – the international standard for IT service management that is recognized throughout the world – and best practices on IT service management as identified in the Information Technology Infrastructure Library (ITIL).



## 01 Digital Transformation Roadmap

Thaioil continues to focus our efforts on adopting digital technology to increase the Company's competitive advantage. Over the past few years, we have developed a workplan and implemented various initiatives to continuously integrate the use of digital technology in our work processes. The list below presents some of the key projects we have implemented in 2021.

### CrudeFlex

The CrudeFlex tool is a prime example of the application of digital technology to increase efficiency in work processes. Thaioil developed this tool to accelerate decision-making in procuring crude oil for the refinery. CrudeFlex uses digital analytics to assess data on the Company's previous crude oil procurement records, including the different types of crude oil procured, and enables efficient selection of crude oil. This tool helps increase the Company's ability to purchase crude oil at competitive prices and reduce the risk of damage that may result from using crude oil types that are incompatible with the Company's equipment, or crude oil types that the Company has not processed in the past.

### Advisory Dashboard

Thaioil developed the Advisory Dashboard tool to enable operators to independently control and adjust key metrics of the production process for maximum operational efficiency 24/7 (24 hours/7 days). In this way, the tool contributes to increases in profitability and reduction in production costs.

### Value Chain Digital Platform

Thaioil remains committed to increasing efficiency in all work processes throughout our business value chain. We prioritize ensuring fluid coordination and integration between all business functions, especially for operations and commercial activities, to enable competitive advantage in the short and long terms (Operation & Commercial Excellence to Business Excellence). We have also developed a masterplan to adopt digital technology to build the capacity of various processes throughout the Company's value chain. This masterplan, called the Value Chain Digital Platform Masterplan, or VCDP, includes the following six focus areas:

**01** **Market Intelligence & Hedging:** This focus area centers on analyzing market conditions and developing accurate and reliable forecasts of product prices, while reducing risks from volatility associated with those products.

**02** **Planning, Scheduling, & Crude Selection:** This focus area centers on flexible production planning that allows adjustments to adapt to changing market conditions. It also includes the creation of tools to support decision-making in procurement of crude oil – our key raw material – to achieve competitive prices and maximize profits.

**03** **Production, Blending, Logistics, & Maintenance:** This focus area centers on driving efficiency in production processes while maintaining flexible production plans. It also includes capacity building for operators, making adjustments to accelerate work processes related to product delivery and distribution, and ensuring maintenance under reasonable costs.

**04** **Sales, Finance & Accounting:** This focus area centers on delivering good customer service and building strong customer relations in all associated activities, including customer registration, order processing and management, product delivery and distribution, payment, as well as systematic customer data collection and analysis. This focus area is critical to improving our customer service, creating positive customer experiences, and expanding opportunities to increase profits.

**05** **Business Control Tower:** This focus area centers on ensuring that management can access accurate and timely data on operational and business performance, and are able to adjust corporate strategy accordingly to meet the changing circumstances.

**06** **Data Integration & Data Platform:** This focus area centers on developing plans to establish an organizational database system that integrates data across the organization; offers accurate, reliable, and timely access to data; and enables efficient data analysis that supports the needs of the business and relevant working teams.

## 02 Cyber Emergency Response

Over the past year, Thaioil completed an assessment of the Company's cybersecurity system with an external consultant (Deloitte). We reviewed the results of this assessment and completed recommended actions to strengthen the system. This included updating our cybersecurity plan to reflect trends in critical cyber threats. For example, in response to trends in ransomware attacks, the Company took additional measures to establish a zero trust architecture and added controls in accessing Company computers. We also hired a cyber-security expert, Mandiant, to assess organizational readiness to respond to ransomware attacks in order to identify performance gaps for improvements and to establish protocol to ensure readiness in responding to such incidents.

### Measures to Ensure Cyber Security

To reinforce our efforts to control and mitigate cyber risks, and ensure that our measures adequately correspond with the size and variety of our business, Thaioil aligned organizational practices with the Cybersecurity Framework of the National Institute of Standards and Technology of the United States (NIST Cybersecurity Framework). We have also adopted the zero trust architecture as a basis for setting cyber governance management guideline by authenticating users' login credentials every time when accessing to the Company's servers, and granting users the minimum level of privilege permissions to perform their assigned function. Some highlighted measures are presented below.

1. Privilege Access Management (PAM) for computer systems with different servers
2. Multifactor Authentication (MFA) for users accessing through VPN and email systems
3. Installation of endpoint detection and response (EDR) on all computers
4. Monthly phishing email drills to test employee understanding of cyber threats, build awareness, and change employee behaviour
5. Established a cyber emergency response procedure that aligns with the Company's emergency response plan. The plan is tested at least twice a year and covers digital technology, operational technology, business continuity plan, and plans to report the incident to relevant functions and external stakeholders



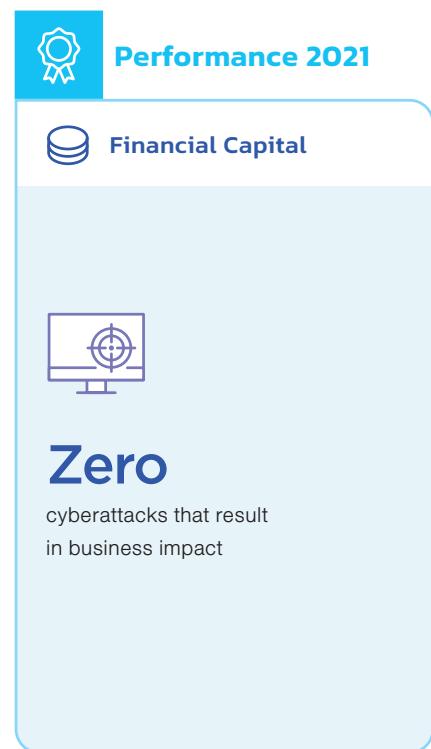
### Measures to ensure compliance with the Personal Data Protection Act, B.E. 2562 (2019)

Thaioil has improved organizational working processes and systems related to digital technologies in order to ensure compliance with the Personal Data Protection Act, which will come into effect on 1 June 2022 and onwards. We are committed to continuous improvement in this area to ensure efficient management and control of personal data in the organization, and to secure the confidence of the stakeholders whose data is on our system. Details are outlined below.

	<p><b>Governance and Improvement of Working Process</b></p> <ul style="list-style-type: none"> <li>Review and update different policies related to digital technology, such as the Digital Technology and Communication Policy, the Social Media Use Policy, and the Personal Data Use Policy.</li> <li>Prepare employees and test their knowledge of working processes.</li> </ul> <p><b>Build knowledge related to personal data use and foster privacy awareness</b></p>
	<p><b>Personal Data Management System</b></p> <p>Develop a database to host personal data, and develop a system to notify use of this database, request consent, revoke access, and send other requests to the data owner.</p> <p><b>Ensure ongoing risk assessment, development of improvement plans, and risk reduction measures.</b></p>
	<p><b>Personal Data Loss Prevention Systems</b></p> <ul style="list-style-type: none"> <li>Develop a system to protect users from data loss resulting from the use of programs from those with rights and permissions to access only.</li> <li>Develop a system to protect data, with password controls for data use external hard drives.</li> </ul> <p><b>Develop password controls for personal data, and protection from revealing personal data.</b></p> <p><b>Run tests and scans to identify gaps in the program.</b></p>
	<p><b>Data Use Inspection and Monitoring Systems</b></p> <ul style="list-style-type: none"> <li>Keep records of access and use of personal data.</li> <li>Conduct penetration testing for programs that use personal data.</li> </ul> <p><b>Apply advanced technologies to strengthen protection systems and counter cyber-attacks.</b></p>

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

Thaioil recognizes that the quality of digital services is a key factor in determining organizational efficiency. Thus, we have improved digital services within the organization to meet the requirements of ISO/IEC 20000-1:2018 – the international standard for IT service management that is recognized throughout the world. We have also followed best practices in IT service management as identified in the Information Technology Infrastructure Library (ITIL) to advance our digital service processes. Through adopting technology, we continue to increase organizational efficiency while also building better user experience.





## Intellectual Capital



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

- 1 The Data Center and SAP, and LIMS systems – under the control and management of the Digital Function
- 2 The Advanced Process Control Network – under the control and management of the Technology Process Control Function, which supports the organization of various activities and working processes within Thaioil Group
- 3 Instrument Network – under the control and management of Instrument Engineering Functions
- 4 The telecommunications and ELICS systems – under the control and management of Electrical Engineering Functions

**Total**

**100%** certified by ISO 27001



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

Certified in 2021



# INNOVATION, RESEARCH AND DEVELOPMENT MANAGEMENT



## CHALLENGES, RISKS, AND IMPACTS

Businesses across the world are facing numerous impacts from recent technological developments, environmental changes, and uncertainty amidst the COVID-19 pandemic. The imperative to adapt to rapidly changing external conditions – and subsequent changes in consumer behavior and lifestyles – is more pressing than ever. Furthermore, the agreement of the 26<sup>th</sup> UN Framework Convention on Climate Change Conference of the Parties (COP26) in order to achieve net zero greenhouse gas emissions is both a challenge and a potential major impact to our business in the future. This may lead to a coming revolution that will completely change the nature of business, and Thaioil is duly aware of these trends, changes, and expected impacts on our business.



## COMMITMENT AND TARGETS

In confronting those challenges, Thaioil endeavors to develop production processes in the organization for maximum efficiency while developing high value products. Research and development is the key enabler to achieving the set targets in the Company's strategic plan. The Manufacturing Department, Commercial Department, and Business Development Department together collaborate to better respond to customer wants and centering product development on customer expectations. Meanwhile, the Research and Development team leads the Working Committee on Carbon Capture and Storage and Carbon Dioxide Utilization, as defined in Thaioil Group's pathway to reduce greenhouse gas emissions and achieve net zero emissions by 2060, and other tasks in developing low carbon businesses such as hydrogen and bio-businesses. Thus, the Company has established the following approach.



## Targets 2021

Thaioil developed a framework for product development that has three main pillars, including:



### Pillar 01

Building competitive advantage in the petroleum and petrochemicals business through research and development



### Pillar 02

Developing new high value products.



### Pillar 03

Developing new businesses in clean energy, such as hydrogen and aviation biofuels.

For product development, Thaioil will add value to existing products and new products. Through collaborations between businesses in the Group and the Research and Development team, the Company will create and develop added value products, in conjunction with setting a shared target and regularly report progress to the relevant Committee.

For environmental stewardship, Thaioil established a working committee, with the Research and Development team tasked with studying and selecting carbon capture, utilization and storage (CCUS), as well as a working committee on Hydrogen and Bio-Products, and the Research and Development team is also part of the Committee to drive and support information on technology. Thaioil also developed a masterplan to reduce greenhouse gas emissions from our business activities, such as production and transport activities.

For promoting innovation culture in the organization, Thaioil supports and motivates employees to think innovatively, appreciate the importance of innovation, and keep their minds open to adapt to the modern world.

### Short-term targets to be achieved in the next 1-3 years

In line with the aforementioned three-pillar framework, Thaioil and Subsidiaries have made a formal commitment to achieve 3-5 high-value products (HVPs) by 2022. The Research and Development team will be the primary driver for this target, with supporting partnerships with technical experts.

To support the third pillar of the framework, the Research and Development team is also involved in the Working Committee on New Product Development. The Committee has appointed subject matter experts to research technology options for investment and collaborate with external experts on research projects. The overarching goal is, as outlined in the Company's strategic plan, to develop the Company's clean energy business – e.g. hydrogen, biofuels, and carbon capturing, utilization and storage (CCUS).

In 2021, the Research and Development team studied and completed the design of a crude oil pilot plant for the Clean Fuel Project, and would be presented to the Board to request approval, in line with the first pillar of the framework.

For Innovation, the Innovation team will organize an innovation competition to incentivize employees to create and innovate, as done so in previous years, once the pandemic subsides and normal conditions resume.

### Medium-term targets to be achieved in the next 3-5 years

In response to the strategic direction of Thaioil and Subsidiaries, including goals to invest in research and development to support the second pillar in developing new high-value products and the third pillar in developing clean energy businesses and making plans to use technology to achieve the organization's net zero pathway targets – the Research and Development team has plans to increase the number of personnel in the team, build their capacity, and prepare to make partnerships with experts. In this way, the Company will support business expansion to petrochemicals and clean energy businesses, in line with the organization's strategic plan.

For innovation, Thaioil aspires to be a learning organization, where employees have an understanding of creative and innovative thinking, have the "innovator DNA", and can wholly contribute to the organization through innovations.



## MANAGEMENT APPROACH



### Innovative Culture

In order to be effective across time, an innovative culture needs to include continuous development of new discoveries and ideas. To foster this kind of innovative culture, Thaioil has implemented initiatives to inspire employees to innovate and adapt to the rapidly changing conditions resulting from the COVID-19 pandemic. The team responsible for fostering an innovative culture in the organization has prioritized instilling innovative values among employees to support them in creating and innovating within their own teams. It is our hope that promoting innovation will help the organization to continue operate our business sustainably.

In 2021, Thaioil initiated a new project to promote innovative thinking in employees and build their capacity as innovators through innovation weekly email updates. The email content contains information that promote creative and out-of-the-box thinking and a growth mindset, and are intended to give

employees the skills that innovators should have. The emails also provide information on the importance of innovation in the current world and new technologies. The Company has received positive employee feedback on these weekly emails. The weekly updates gathered over 3,055 views and over 90% of readers said they were highly satisfied.

The Company collaborates with various external organizations, with the Research and Development working with organizations across the academic, government, and industrial fields. In academia, we partnered with the Petroleum and Petrochemical College of Chulalongkorn University to develop a number of research projects, and worked with the Vidyasirimedhi Institute of Science and Technology (VISTEC) to brainstorm new ideas for potential research projects in the future. In government, we worked with the Thailand National Metal and Materials Technology Center (MTEC) of the National Science and



Technology Development Agency (NSTDA) on a study on catalysts. In industry, we collaborated on a project to develop asphalt emulsions with Kao Thailand Company Limited. Thaioil strongly believes that collaborations with external institutes and agencies such as these will help the Research and Development team achieve organizational goals.

A key research project that was completed in 2021 is the Crude Compatibility Prediction Model Research Project, which will create benefits for the organization in selecting crude oil to process in the refinery, thus also lengthening the life expectancy of the heat exchangers used in the refining process. The Project also enables the organization to make use of a wider variety of crude oil types.

As a result of our continuous efforts to drive innovation development over the past years, Thaioil received the “Most Innovative Ecosystem 2021 Award for Energy and Utilities” from

the International Finance Awards (IFA) magazine, a leading business and awards magazine based in London, United Kingdom that selects organizations with exceptional performance in a number of defined areas. Various organizations from all over the world are considered for this award, and are required to meet the magazine's criteria. This award has been organized for the ninth year.

To meet the criteria of the International Finance Awards, the organization must demonstrate that its strategy has been developed to build an innovation ecosystem that is conducive to the development of new products and services that have commercial value. The organization must also have an innovative culture and maintain sustainable and socially responsible business operations. In that regard, Thaioil has long used the 3E+E principles – Educate, Execute, Exhibit, and Evaluate – to promote an innovative culture within the organization.



## Product Innovation

The Research and Development team adapted its approach from primarily focusing on solving problems in the production process to doubling down on collaborative product development to create new high value products that better respond to customer needs. The team also increased efforts in identifying opportunities to develop high value products with partners in Thaioil Group as well as beyond. The team worked

with the Product Sales team to brainstorm new product ideas, and partnered with academic institutes to study technology and business trends and glean opportunities to develop new products. As of present, the Company is studying the feasibility and cost-effectiveness of a number of projects to develop new products. Highlighted high-value products developed by Thaioil are presented below:



### LABIX Heat Transfer Oil

The LABIX Heat Transfer Oil product is designed for use in hot oil boilers that operate at 300 °C or below. As the material is produced with oil synthesized from heavy alkylbenzene, the product can withstand high temperatures and has high resistance to thermal cracking, and thus a longer service life than mineral heat transfer oils. Synthetic heat transfer oils were previously unavailable in Thailand and had to be imported, and LABIX is the first manufacturer of this product in Thailand.

#### Product Properties

- For use in closed heat transfer systems at temperatures between -30 and 300 °C
- Stability at high temperatures and high resistance to thermal cracking supports a long service life
- High flash point
- Maintains fluid quality and prevents corrosion

The product can be used across a range of industries such as:

- Steam production
- The pulp and paper industry
- The plastic and polymer industry.



#### Light Color HAB

Heavy alkyl benzene (HAB) is a by-product from linear alkyl benzene (LAB) production. Previously, HAB was distributed to customers to be produced as the primary ingredient for a variety of products, such as lube base oil, coolants, and heat transfer oil. However, recent LABIX efforts to increase LAB yield resulted in a darker yellow color for the HAB by-product. This presented a pain point for the teams, as the market price for dark yellow HAB is lower than light yellow HAB. The Research and Development team then commenced a study on the adsorption process and looked into using activated carbon to improve the color quality of the HAB in order to obtain the light yellow color desired by customers and add value to the product.

The project is currently in the testing phase, and the laboratory teams have been recording the results of tests run to improve the color quality of HAB through adsorption with activated carbon. Results will then be used to calculate the cost effectiveness of investing in building an adsorption unit and to design a reactor at a commercial scale.



#### HAB with Pour Point Depressant (PPD) property

Observation in the laboratory revealed that once the HAB product is added to TDAE – a rubber processing oil that is used in producing processed oil – it exhibits a similar property to pour point depressants, or PPD, which are additives used to reduce the crystallization temperature of waxes obtained from crude oils. The HAB product, once added to the TDAE, significantly reduced the crystallization temperature of the TDAE. This finding attracted the interest of LABIX Company Limited in pursuing product development. LABIX thus worked with the Research and Development Team and the Laboratory Team to develop the PPD property in HAB product and counted this as part of the target to develop added value products.



#### Bitumen 40/50

Bitumen 40/50 is a special grade bitumen with a higher quality and price than the normal grade bitumen (60/70). This product responds to the needs of the Department of Highways of Thailand, and other customers who are looking for bitumen with higher durability.

Bitumen 40/50 is durable and can reduce rutting in comparison to normal grade bitumen. The Company has tested this product at higher temperatures, and developed high quality bitumen that can be used in a larger variety of traffic conditions while also having longer life expectancies.

As the special grade bitumen sells at a higher price than normal grade bitumen, Thaioil Group's profits also increased as a result.



#### Asphalt Emulsion

Asphalt emulsions are composed of asphalt cement, emulsifiers, and water, with the first being the primary raw material. The material can be used at low temperatures (20-70 °C) and is suitable for pavement maintenance and preparation, as the material glues pavement layers together. After the pavement is laid, the water evaporates and the asphalt remains as a film on top of the pavement. Maintenance can be completed in a short time and the road can promptly be reopened. Additionally, asphalt emulsions can also be used for minor pavement repair needs.

As water replaces part of the asphalt content for asphalt emulsions, the product requires less costs for purchasing asphalt cement. In this way, the Company was able to increase margins by 20-30% of the asphalt cement selling price.





## Process Innovation

Thaioil supports all departments in using innovative thinking to apply technology and innovative ideas to improve the production process to optimize resource efficiency while increasing production efficiency and reducing costs. The Company has conferred with other PTT Group companies to research decarbonization technology in order to develop new technologies to reduce greenhouse gas emissions. The Company continuously applies innovation to increase efficiency in the production process. Below are the process innovation achievements:

### Crude Compatibility Prediction Model

This project is part of the CrudeFlex program, which creates benefits for the organization in selecting crude oil to process in the refinery. Selecting and processing only compatible crude oil types can lengthen the life expectancy of the heat exchangers used in the refining process, while also helping conserve energy. Furthermore, through this model, the Company can use a larger variety of crude oil types and rely less on external consultants for technical advice. This project generated an estimate of 9 million THB worth of benefits in 2021. In 2022, Thaioil has plans to expand the scope of this research project to include even more crude oil types.

### CrudeFlex Program

The CrudeFlex Program is a digital application that was developed to increase the efficiency of procurement processes in assessing crude oil options and making purchasing decisions. This program successfully reduced the time taken to analyze and select crude oil options by 80%, and also provided alerts to users when a particular crude oil option was identified as incompatible with the production process. Furthermore, with CrudeFlex Program's database system, which automatically updates itself, users can refer to the Program for a range of information whenever they need to.

Use of the CrudeFlex Program started in April 2021. Since then, it has supported procurement teams in selection and purchasing approximately 22.8 million THB worth of specialty crude oil products, in comparison to our initial 2021 target of 16.5 million THB.



## Performance 2021

In 2021, Thaioil completed two research and development projects and started implementing them into practice as follows:



### The CVD Graphene Synthesis from C5 Agent Project

was built on a research project that Thaioil had previously done in partnership with the Vidyasirimedhi Institute of Science and Technology. In collaboration with planar TECH Thailand Company Limited, Thaioil commenced this research project to elevate production at the semi-industrial level. Outcomes from this research include a CVD graphene production process, identified operating conditions (such as temperature, flow rate, and pressure), details on the properties of the CVD graphene produced through this process, initial estimates of production costs, potential applications, and methods to test the properties of the produced CVD graphene.



### The High Temperature Ceramic Paint for Heat Insulators Project

is an extension from the Ceramic Paint for Industrial Heat Exchanger Pipes Project and applications done by Thaioil researchers. The material developed as a result of this project was found through laboratory testing to be highly heat resistant, and can withstand heat of over 800 °C. It has higher adhesion than the force of the insulator, high corrosion resistance to acids (e.g. sulfuric acid) at pH levels of 2-3, and re-emissivity – which then also helps increase the efficiency of the burner.



### Financial Capital



Spending on research and development in 2021

**28** million THB



### Intellectual Capital



Numbers of patent applications submitted in 2021

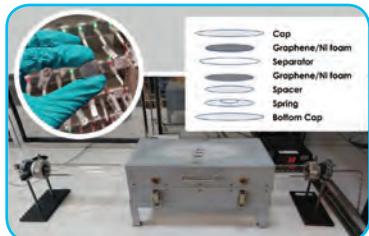
**4** applications

**Thaioil submitted a total of four patent applications in 2021**



Patent application for “Solvents used to prepare catalysts with molybdenum (Mo) and Class 8 metals that can be used to synthesize catalysts for hydrodesulfurization”

Thaioil submitted a patent application in Thailand under the name “Solvents used to prepare catalysts with molybdenum (Mo) and Class 8 metals that can be used to synthesize catalysts for hydrodesulfurization” to obtain catalysts that are efficient in desulfurization.



Patent application for a “Method for Graphene Preparation Using C4 – C6 Hydrocarbon Compound”

Thaioil submitted a patent application in Thailand under the name “Method for Graphene Preparation Using Hydrocarbon Compound with 4-6 Carbon Atoms” to protect the right to a graphene preparation method that uses the PN3 agent (Mixed C5) – which the Company obtained from Sak Chaisidhi Company Limited – and the right to apply the produced graphene for various uses such as for batteries, condensers, and anti-corrosive agents.



Patent application for the “High Emissivity Coating Compositions, and Processes for Preparing and Applying the Same”

Thaioil submitted patent applications in Thailand and the United States under the name “High Emissivity Coating Compositions, and Processes for Preparing and Applying the Same” to protect the rights to the Company’s ceramic coating composition, preparation procedure, and process used to coat metals to maximize thermal emissivity.



Petty patent application for the “Heat Exchanger Cleaning System”

Thaioil submitted a petty patent application in Thailand to protect the rights to the use, quality, elements, mechanism, structure, and the robotic process of the “Heat Exchanger Cleaning System”. This system is designed to clean brazed plate heat exchangers, and is a highly efficient cleaning system that helps restore the heat exchange efficiency of heat exchangers. The system uses laser technology, which allows it to accurately locate and clean gaps in heat exchangers, and includes a specially designed high pressure water gun that can reach spots that are difficult to access.



# CUSTOMER RELATIONS MANAGEMENT



## CHALLENGES, RISKS, AND IMPACTS

**Maintaining customer satisfaction with products and services is critical to business success, especially in the existing market environment where the market is highly competitive and dominated by consumer products. In a context where customers have the option to resort to other sellers, the Company faces challenges in both maintaining and growing the customer base.**



## COMMITMENT AND TARGETS

**Thaioil Group has a strong aspiration to maintain strong relationships with existing customers while building new connections with potential customers. We are driven to achieve the highest possible customer trust and satisfaction.**

To that end, the Company has focused efforts in maintaining customer satisfaction with our products and providing quality service throughout the processes, starting from product ordering to delivery. We manage these processes to ensure that customers receive all products on time and as ordered, and any complaint raised is responded in a timely manner and closely monitored until the issue is resolved. Furthermore, we work closely with customers to develop products that respond to their needs. This helps the Company to adjust the marketing plan as needed and build strong strategic partnerships.



### Target 2021



Maintain customer engagement rate with Thaioil Group above

**92%**



## MANAGEMENT APPROACH

The Company implements a management approach that includes a variety of measures to accommodate different customer needs. This firstly includes organizing activities to build customer engagement on an ongoing basis. Secondly, the Voice of Customer (VOC) system collects feedback and suggestions submitted by customers through the Company website, phone calls, and emails. At the same time, we proactively seek customer feedback and suggestions through administering monthly and annual customer engagement surveys and appointing Company's representatives to directly engage customers. We have also established communication channels and a complaint response procedure to ensure immediate response to any complaint or feedback received. Through this procedure, the Company analyzes the cause of the issue, determines and proposes solutions to the customer, and monitors the result to prevent the recurrence in the future.

### Customer Service During the COVID-19 Pandemic

Despite the challenges of the COVID-19 pandemic and employees having to work from home, Thaioil's corporate commercial function has continued to maintain regular communications with our customers through different channels, including virtual meetings, emails, and phone calls. Customers visiting to pick up products through trucks or ships are also regularly updated and informed of the Company's COVID-19 controls and preventive measures.

Thaioil and subsidiaries prioritize maintaining close working relationships with customers. This means we coordinate closely with customers to ensure that all products are delivered as expected and that all customer needs are responded promptly and effectively. Our communication channels and feedback systems have been designed to facilitate customers in easily reporting issues, submitting complaints, and/or sharing suggestions. Customers can directly submit these through directly calling or emailing the Company, or filling a form on the Company website, and can expect to receive a progress update on the issue from the Company within 24 hours of complaint submission. All feedback shared is stored in the Voice of Customer system. The database accumulates all relevant data, and can be readily accessed to see the details of the complaint/feedback recorded and the status of that complaint/feedback. The system also provides a summary of the types of complaint/feedback. This database helps the Company in determining key gaps in our service delivery and improvement areas needed.

Furthermore, Thaioil also seeks customer feedback on a monthly basis through quick customer feedback surveys. These quick surveys help us improve actions more promptly. At the same time, we regularly organize customer meetings to take feedback and gather ideas that could be applied to improve and develop our work processes. During the COVID-19 pandemic, the Company continued to meet with customers through virtual meetings to maintain strong relationships and provide weekly, monthly, and quarterly updates on market conditions in Thailand and abroad.

In 2021, Thaioil Group implemented the Partnership for Life initiative to support customer services. The initiative consists of three key priorities, including:



Alongside the Partner for Life initiative and the three key priorities outlined above, Thaioil Group has also implemented three additional projects to maintain customer engagement, including:

The “Abdul” Project – The Company developed a database system that helps standardize and streamline responses to frequently asked questions.

The “Oon Jai” Project and the “Pai Duay Kun” Project – Through maintaining close communications and organizing virtual meetings with customers during the COVID-19 pandemic, these two projects build customer trust and assure customers that the Company is ready to provide customers with the support they need, and remains committed to growing alongside customers.



### Performance 2021

The results of the customer engagement survey demonstrate that the Company's efforts in maintaining customer satisfaction with products and services have been fruitful and resulted in a customer engagement rate exceeding of 94%, exceeding our target. For TOP Solvent Company Limited, the customer engagement score was 4.85 out of a total of 5.0 points, which is also better than the set target.



\*Remark: Customer engagement of Thaioil Group (TOP/TPX/LBL)



# ESG RISK IN SUPPLY CHAIN MANAGEMENT



## CHALLENGES, RISKS, AND IMPACTS

Conducting business with partners in a way that does not create adverse environmental, social, and governance (ESG) impacts is vital to ensuring a strong core business, enriching stakeholders' well-being, and delivering sustainable returns. To that end, Thaioil has a supplier management process that includes sustainability risk management in the supply chain. We have also implemented additional supplier management measures during the COVID-19 pandemic, including communicating measures to prevent transmission outbreak for suppliers of Thaioil Group, providing work from home options to contractors, assessing risks and tracking of long lead items, and managing suppliers during maintenance.



## COMMITMENT AND TARGET

Thaioil is committed to implementing sustainable procurement practices that align with the Thaioil Group Sustainability Management Framework. This means we carry out our work with due consideration towards sustainability in the economic, social, and governance dimensions, and comply with our procurement principles – namely, Clear, Fair, and Professional – in line with the Sustainable Code of Conduct for Suppliers of Thaioil and Subsidiaries (SCOC). Since 2015, all newly registered suppliers onto the system are required to sign their acknowledgement of the SCOC, and we continue to monitor and drive improvement in supplier performance in this area. The Company takes action to ensure that our procurement processes support the realization of the corporate business strategy, while also following international standards of practice such as ISO 20400: Sustainable Procurement. We recognize that sustainable procurement will help reduce supply chain disruption and delay risks resulting from unforeseen events, contribute to efficient resource management, which will increase our competitive advantage and generate long-term benefits for Thaioil Group and our partners as well as build stakeholder confidence and trust.



### Targets 2021

#### SCOC Acknowledgement

<b>100%</b>	<b>80%</b>	<b>100%</b>
of critical suppliers signed acknowledgement of the SCOC	of key suppliers signed acknowledgement of the SCOC	newly registered suppliers signed acknowledgement of the SCOC

#### Supplier Engagement and Satisfaction

Maintain more than **90%** of overall supplier satisfaction with Thaioil

#### ESG Risk Assessment

##### Zero non-compliance

in procurement processes for the Company's major projects, while maintaining an effective oversight through internal audit systems to ensure transparency and ethical business practices

##### More than 80%

of critical suppliers to be assessed through ESG risk assessment  
Less than **0.19** by volume of Ocean Loss Index for Oil loss during marine transportation



### Long-term Targets

#### ESG Risk Assessment



#### 100%

of critical suppliers to be assessed through ESG risk assessment by 2026



## MANAGEMENT APPROACH

### Thaioil Group's Suppliers

Thaioil classifies Tier-1 suppliers into three groups, including:

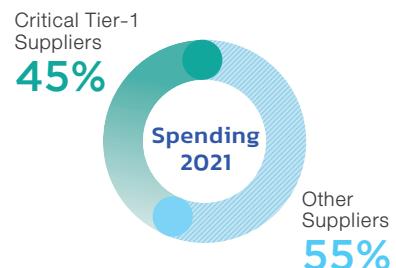
- 01 **Strategic Suppliers (Critical Suppliers)** : suppliers that are essential to Thaioil Group's businesses
- 02 **Key Suppliers** : suppliers that provide goods and services for Thaioil Group
- 03 **Managed Suppliers** : general suppliers that provide goods and services for Thaioil Group

Furthermore, the Company also defines Critical Non-tier 1 suppliers as those that supply goods and services to our Strategic Tier-1 suppliers that supply highly essential goods and services to Thaioil Group.

In 2021, Thaioil has a number of suppliers, classified by the type of supplier, as follows:

Total Tier-1 Suppliers	Critical Tier-1 Suppliers	Critical Non-tier 1 Suppliers
1,086	46	12

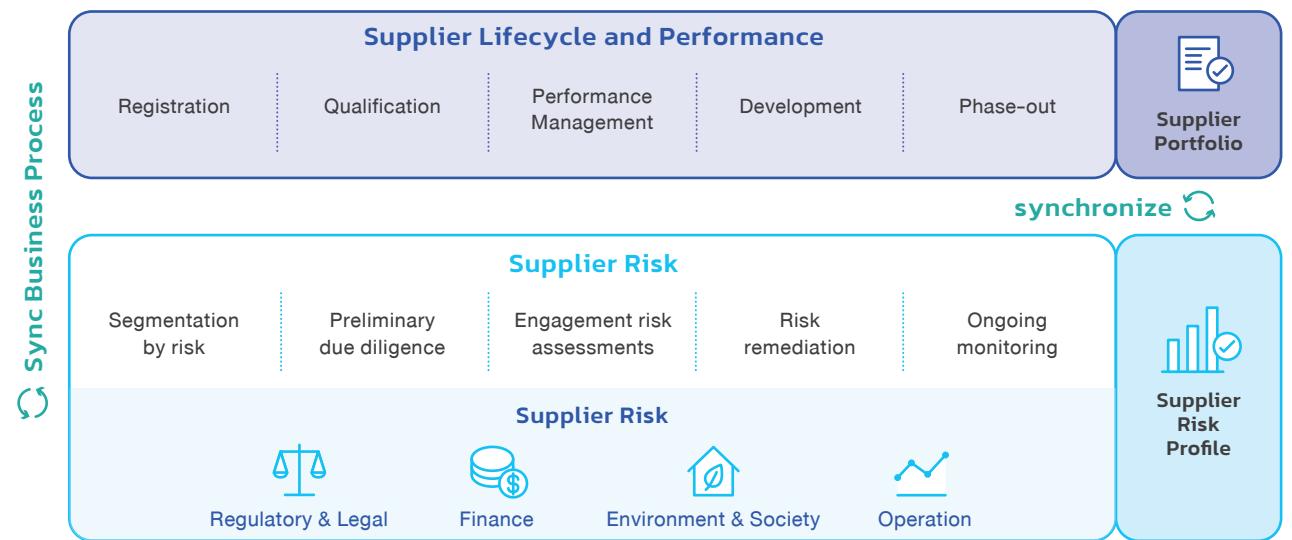
Share of total procurement spent by critical suppliers



### Supply Chain Management

Thaioil's supplier management system starts from supplier registration and is followed by assessments of supplier qualifications, lifecycle, and performance. The Company also monitors and reviews supplier risks – including regulatory and legal, financial, environmental and social, and operational risks – through external database systems.

#### Supplier Management System



## Effective Cost Management

Thaioil has determined targets to reduce costs in the procurement processes. In 2021, these targets were successfully met, which enabled the Company to gain effective cost management and have competitive costs in the market. We were able to increase the efficiency of our procurement processes while upholding our commitment to reduce impacts on the environment. Key completed initiatives are listed below:

- Arrangement of framework agreements: Thaioil continued to use framework agreements, or long-term contracts of 5-6 years, for suppliers of product groups that are essential to Thaioil Group. This helps the Company secure standard prices and maintain continuous trading in the long term. The framework agreements have also helped to establish good relationships with our business partners, and are mutually beneficial. This resulted in cost savings of approximately 25% per task – e.g. procurement of spare parts and distributed control systems (DCS).
- Demand management based on historical data: In planning procurement, Thaioil manages organizational demand through analyzing historical data to identify goods and services with ongoing purchases, and developing annual contracts for these goods and services. Through using annual contracts, the Company gains increased bargaining power and reduces time needed for procurement activities. These benefits are equivalent to cost savings of approximately 9% per task – e.g. procurement of catalysts and contracting for equipment maintenance.
- Contract analysis: Thaioil conducts contract analysis once the purchase/service requisition has been issued in order to plan for strategic sourcing. This resulted in cost savings of 6% per task – e.g. procurement of spare parts and equipment, or contracting for technical services such as electricians, mechanics, and engineers.
- Procurement in collaboration with PTT Group: Thaioil collaborates with other companies in PTT Group to develop contracts with suppliers. Through collectively combining orders, Thaioil and other PTT Group companies are able to develop high volume contracts and increase bargaining power. Furthermore, this initiative helps foster good relations with other PTT Group companies and suppliers. The Company was able to achieve cost savings of approximately 10% per task – e.g. procurement of chemicals and contracting for services such as vehicle rentals.
- Budget analysis: In planning for the implementation of various projects, Thaioil has developed a procurement sourcing plan for the delivery of goods and services in accordance with the project timeline.
- E-Auctions: Holding e-auctions for goods of similar standards have increased the efficacy of the procurement process, the diversity of bidding suppliers, and the competition.
- “ONE” Project: Through the “ONE” Project, Thaioil works closely with PTT Group companies and refineries in crude oil procurement to increase the efficiency and diversity in crude oil procurement, together identify crude oil options with the highest benefits, and ensure prompt response to market volatility.
- Domestic sourcing: Thaioil also collaborates with PTT Company Limited to identify more domestic sources for crude oil procurement in order to avoid impacts from crude oil price volatility.
- The outbreak of the COVID-19 pandemic and continuing virus mutation has contributed to ongoing oil price volatility and uncertainty in demand of petroleum products. Thus, Thaioil adjusted our crude oil sourcing approach for more flexibility through aligning the volume and type of crude oil inventories with the market conditions at that point in time. Additionally, we have sold some of the crude oil we had in storage while sourced and refined crude oil with higher value (crude re-optimization), and used derivatives to manage crude oil prices from Abu Dhabi (ICE Future Abu Dhabi: IFAD). Consequently, the Company generated additional value of 1,500 million THB.
- Reducing crude oil costs: Thaioil has continued to provide crude oil transfer services through the Company’s crude oil buoys to other refineries in Thailand. Additional, Thaioil has also partnered with other refineries to hire oil tankers in order to reduce crude oil costs. In 2021, revenue from the Company’s crude oil transfer services and cost savings from crude oil transfer were equivalent to 190 million THB.



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

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

In 2021, the Company assessed supplier risks relating to the ESG issues listed in the Sustainable Code of Conduct for Suppliers of Thaioil and Subsidiaries (SCOC) for 100% of newly registered suppliers, and completed the triennial risk assessment for 100% of suppliers.

The risk assessment is conducted based on product and service group, with the relevant function responsible for the product or service group taking on the role of assessing risk levels. The risk assessment covers all 7 topics identified in the ISO 20400 Sustainable Procurement standard as follows

- Governance
- Human rights
- Labour practices
- Environment
- Fair operating practices
- Consumer issues
- Community involvement and development

The 2021 risk assessment was conducted amidst the continuing COVID-19 pandemic. Thaioil assessed risks across the supply chain and considered suppliers' quality of work, occupational

health and safety performance, and ability to deliver goods and services on time. For long lead items, the Company monitored COVID-19 updates in Thailand and abroad and the status of the delivery. We maintained close communications with contractors to manage operators that are onsite, especially during maintenance turnaround. We also prepared response plans in the event that an outbreak occurs and affects the maintenance plans. Henceforth, the Company was able to complete maintenance turnaround faster than the planned timeframe.

In 2021, Thaioil completed risk assessment for 100% of suppliers, or 1,086 Tier-1 suppliers and 12 Critical Non Tier-1 suppliers. Findings are listed below:

- 22 Tier-1 suppliers, or 2.03% of all Tier-1 suppliers, have ESG risks
- No Critical Non Tier-1 suppliers with ESG risks

As a result of the preliminary risk assessment, Thaioil selected a total of 49 Critical Tier-1 suppliers and Critical Non Tier-1 suppliers (84.48% of all critical suppliers) and 20 suppliers with high ESG risks (91% of all suppliers with ESG risks) to participate in a third party assessment. The assessment looked at supporting evidence in the form of assessment certificates – e.g. ISO 14001, ISO 18001, ISO 26000, ISO 20400, the Green Industry Award handed by the Department of Industrial Works, the CAC project, results of safety assessments, and results of waste management assessments.



## Monitoring the Effectiveness of Risk Management Measures



### Governance

Thaioil expects that all suppliers will sign their acknowledgement of the Thaioil Group SCOC. To ensure that suppliers understand the contents of the SCOC, Thaioil also communicates to them through the Thaioil website and the Annual Thaioil Group Supplier Seminar.



Please see more details on the Supplier Code of Conduct in the Company's website. To access the SCOC through the website, go to Thaioil's website, choose the "Procurement" section, "Supply Chain Management" section, then "Sustainable Code of Conduct for Suppliers of Thaioil and Subsidiaries". It is also directly available through this link: <https://www.thaioilgroup.com/home/content.aspx?id=239&lang=en>

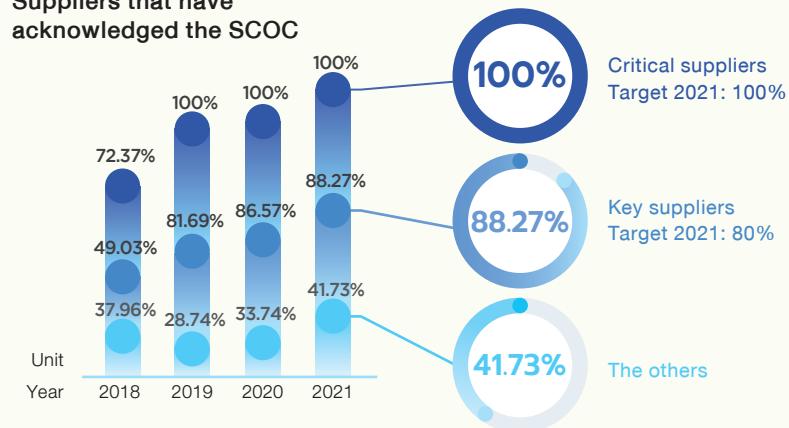
All Suppliers that have acknowledged the SCOC

New Suppliers

**100%** as target 2021

### Non-hydrocarbon group

Suppliers that have acknowledged the SCOC

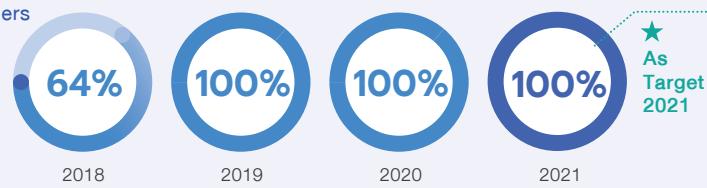


Remark: Accumulated data 2018-2021

### Hydrocarbon group

Crude oil suppliers

Number of suppliers

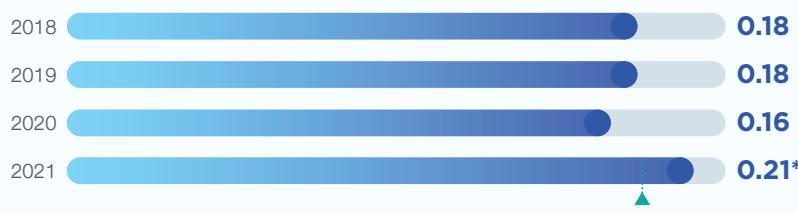


### Environment

Thaioil makes efforts to control oil loss during marine transport (ocean loss index). The Company established the Energy Management and Loss Improvement Working Team and the Internal Energy Audit Team, who are both responsible for monitoring oil loss during marine transport, analyzing the root cause, and assigning corrective actions continuously to maintain oil loss during marine transport within the set targets.

#### Ocean Loss Index

Percent by volume



\*This was the result of the use of new crude oil tanks and oil transfer testing in May 2021.

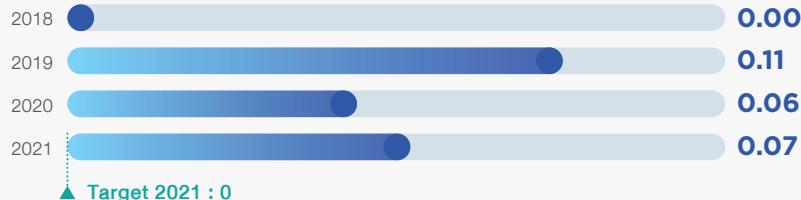


## Safety

Thaioil closely monitors lost-time injury frequency rate (LTIFR) for contractors to ensure that our life and assets are safe and free of accidents.

### Contractor lost-time injury frequency rate (LTIFR)

Case per million work hours



## Supplier Capacity Building

Other than directly providing recommendations to suppliers who have high risk levels and/or non-compliance with the SCOC, Thaioil also gives opportunities for suppliers to join other activities to promote capability and capacity in managing environmental, social, and governance (ESG) performance. Below are some of initiatives completed in the past year:



The Company invited 169 key suppliers to join the PTT Group CG Day in order to exchange knowledge and form a network



The Company communicated our vision, procurement strategy, and proactive measures for SSHE, human rights in the supply chain, and corporate governance, through the annual supplier conference, which was organized under the theme of "Partner for Life"



Meetings between contractors and Thaioil Group's management executives were organized to reiterate to suppliers the importance of safety in the workplace and prepare readiness for the major turnaround to ensure that tasks can be completed as planned



Thaioil continuously communicated COVID-19 control measures through emails and online meetings. We closely managed suppliers, promoted accurate and safe compliance with our measures, and maintained continuous measures, such as organizing ATK training for suppliers



Supplier relationship building activities were organized to ensure that suppliers are aware of, understand, and comply with Thaioil's expectations for transparency in procurement, such as those defined in the No Gift Policy



## Supplier Engagement and Satisfaction

Thaioil Group has put in place measures to ensure that procurement practices are clear, fair, and professional. The Company uses SAP Ariba Network “E-Procurement” system, which supports supplier engagement, increases efficiency in procurement processes, and enables improvements in sustainable procurement.

As COVID-19 pandemic conditions continue in 2021, Thaioil Group digitized the bidding process to ensure that the Company can continue business with suppliers while complying with COVID-19 control measures. The Company allowed online bid submissions through the E-Procurement system. Throughout 2021, over 200 companies submitted bids in this way. The majority of suppliers were highly satisfied with this system, as it reduced costs and time needed for processing and allowed them to inspect information through the system. This gave suppliers confidence of the Company's transparency and fairness. Furthermore, Thaioil Group started implementing the E-Catalogue system and encouraging the use of the E-Procurement system to approve purchase orders online. This also helps reduce the number of steps needed for approval, facilitate convenience and speed for suppliers, while also being environmentally friendly as it reduces paperwork and resource consumption.

Thaioil Group developed a contractor management system (CMS) to support post-award processes. Through this system, suppliers can apply to obtain the contractor card to enter Thaioil Group premises from any location and at any time. All supplier information collected on this PDPA-compliant system is sorted systematically and facilitated data analysis for users. Furthermore, the CMS also accommodates supplier assessment through the C-PMS (Contractor-Performance Management System). After the contract is completed, Thaioil Group will assess supplier performance based on KPIs that were agreed on with suppliers. These KPIs can cover a range of topics such as ESG, SSHE, and quality. Together with the supplier, Thaioil will exchange feedback to identify areas of improvement for future contracts.

Moreover, in order to ensure that Thaioil is aware of the needs of our suppliers, the Company has continued to engage, communicate, and listen to supplier opinions on different issues. We collect such information through conducting surveys and gathering feedback on our procurement management, service quality, and transparency and fairness. Supplier inputs are then integrated to the Company's decision-making and management process. In 2021, Thaioil employed an external expert to survey supplier perspectives and opinions. The findings from the survey on suppliers' views towards working with Thaioil are presented below:



## Performance 2021



### Social and Relationship Capital

#### Overall satisfaction with Thaioil

Percentage



Target 2021 : Above 90% ▲

#### Satisfaction with service

Percentage



#### Overall image of Thaioil

Percentage



#### Satisfaction with transparency and fairness

Percentage



# PERFORMANCE SUMMARY



 Economic Performance <sup>(1)</sup>	Unit	2018	2019	2020	2021
<b>Economic Value Generated</b>					
Sales Revenue	Million THB	389,042	361,768	242.84	335,827
<b>Economic Value Distributed</b>					
Operating Costs <sup>(2)</sup>	Million THB	373,128	355,756	255,300	319,555
<b>Economic Value Retained</b>					
EBITDA	Million THB	20,239	14,149	(2,056)	28,142
Net Profit/ [Loss]	Million THB	10,149	6,277	(3,301)	12,578
<b>Financial Position</b>					
Total Assets	Million THB	268,613	283,445	306,188	362,144
Total Liabilities	Million THB	142,141	159,521	186,069	239,050
Total Equity	Million THB	126,472	123,924	120,118	123,094
<b>Financial Ratios</b>					
Interest Coverage Ratio	Times	5.1	4.3	(0.5)	7.8
Current Ratio	Times	4.3	3.5	4.0	2.6
Net Debt to Equity Ratio	Times	-	0.3	0.7	1.4
Return on Equity	Percent	8.3	5.2	(2.8)	10.6
Return on Assets	Percent	4.2	2.4	(1.0)	3.9
<b>Stock Data</b>					
Basic Earnings / [Loss] per Share	THB/Share	4.97	3.08	(1.62)	6.17
Annual Average Daily Closing Stock Price	THB/Share	86.88	68.26	43.95	54.38
Market Capitalization	Million THB	177,238	139,252	89,659	110,937
Dividend Payment	THB/Share	2.65	1.50	0.70	2.60
Dividend Yield <sup>(3)</sup>	Percent	3.10	2.20	1.60	4.80
Book Value	THB/Share	59.66	58.81	56.97	59.25

**Remarks:**

(1) Scope of reporting Economic Performance is in alignment with information disclosed in the Thaioil Annual Report 2021

(2) Operating costs are the expenses related to the operation of a business, or to the operation of a device, component, and piece of equipment or facility or location

(3) Calculated from the annual average of the daily closing stock price

Contributions to Organizations and External Associations <sup>(1)</sup>		Unit	2018	2019	2020	2021
Type of Organization	Name of the Organization					
Tax-exempt group	Global Compact Network Thailand	THB	35,000	35,000	35,000	35,000
Trade Association	Board of Trade of Thailand	THB	10,700	0 <sup>(2)</sup>	0 <sup>(2)</sup>	24,610
Trade Association	Investor Club Association <sup>(3)</sup>	THB	9,095	0	0	0
Trade Association	Oil Industry Environmental Safety Group Association (IESG)	THB	1,799,000	1,832,000	1,778,000	1,683,000
Trade Association	Oil Spill Response Limited (OSRL)	THB	2,187,097	1,779,211	1,736,839	1,740,193
Trade Association	International Fund for Compensation for Oil Pollution Damage	THB	0	1,007,946	833,016	0 <sup>(2)</sup>
Trade Association	Petroleum Institute of Thailand (PTIT)	THB	758,660	786,430	824,381	819,309
Trade Association	The Association of Private Power Producers	THB	40,000	40,000	42,800	42,800
Trade Association	Thailand Business Council for Sustainable Development (TBCSD)	THB	250,000	250,000	250,000	250,000
Trade Association	The Federation of Thai Industries	THB	121,980	121,980	216,800	186,180
Trade Association	Thai National Shippers' Council (TNSC)	THB	26,750	26,750	26,750	26,750
Trade Association	The Thai Chamber of commerce	THB	24,610	24,610	24,610	24,610
Trade Association	Water and Environment Institute for Sustainability	THB	53,000	53,000	0	0
Lobbying, interest representatives, or similar	-	THB	0	0	0	0
Local, regional, or national political campaigns/candidates	-	THB	0	0	0	0
Others (e.g., spending related to ballot measures or referendums)	-	THB	0	0	0	0
<b>Total</b>		THB	<b>5,315,892</b>	<b>5,956,927</b>	<b>5,768,196</b>	<b>4,832,452</b>

**Remarks:**

- (1) The scope of reporting is 97% of total sales revenue of Thaioil Group
- (2) Exempted a membership fee
- (3) Renew membership every 5 years

 Occupational Health and Safety Performance <sup>(1), (2)</sup>	Unit	2018		2019		2020		2021	
		Male	Female	Male	Female	Male	Female	Male	Female
Total hours worked	Hour	2,072,882		2,861,233		2,887,982		2,887,293	
• Employees		1,844,465	228,417	2,632,203	229,030	2,625,891	262,091	2,433,255	454,038
Total hours worked	Hour	5,753,718		18,870,649		18,085,177		13,554,027	
• Contractors		4,707,147	1,052,571	16,409,274	2,461,376	14,524,263	3,560,914	10,981,250	2,572,777

## Work-Related Injuries <sup>(3)</sup>

Fatality as a result of work-related injury • Employees	Case	0	0	0	0	0	0
	Case / Million work hours	0	0	0	0	0	0
Fatality as a result of work-related injury • Contractors	Case	0	0	0	0	0	1
	Case / Million work hours	0	0	0	0	0	0.07

 Occupational Health and Safety Performance <sup>(1), (2)</sup>	Unit	2018		2019		2020		2021	
		Male	Female	Male	Female	Male	Female	Male	Female
Total recordable work-related injury rate - TRIR • Employees	Case	0		2		2		1	
		0	0	2	0	2	0	1	0
	Case / Million work hours	0	0	0.12	0	0.76	0	0.41	0
		0	0	0.7		0.69		0.35	
Total recordable work-related injury rate - TRIR • Contractors	Case	2		6		4		4	
		1	0	6	0	4	0	3	1
	Case / Million work hours	0.35		0.32		0.22		0.30	
		0.43	0	0.37	0	0.28	0	0.27	0.39
Lost-time injury frequency rate - LTIFR • Employees	Case	0		1		0		0	
		0	0	1	0	0	0	0	0
	Case / Million work hours	0	0	0.38	0	0	0	0	0
		0	0	0.35		0		0	
Lost-time injury frequency rate - LTIFR • Contractors	Case	0		2		1		1	
		0	0	2	0	1	0	0	0
	Case / Million work hours	0		0.11		0.06		0.07	
		0	0	0.17	0	0.7	0	0	0.39
Near miss <sup>(4)</sup> • Employees and contractors	Case	3,393		3,418		4,521		6,594	
<b>Work-Related Illness</b>									
Fatalities as a result of work-related ill health • Employees	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
Fatalities as a result of work-related ill health • Contractors	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
Occupational illness frequency rate - OIFR • Employees	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
	Case / Million work hours	0		0		0		0	
		0	0	0	0	0	0	0	0
Occupational illness frequency rate - OIFR • Contractors	Case	0		0		0		0	
		0	0	0	0	0	0	0	0
	Case / Million work hours	0		0		0		0	
		0	0	0	0	0	0	0	0
<b>Process Safety <sup>(5)</sup></b>									
Process safety events – tier 1	Event	2		2		1		1	
	Event / Million work hours	0.26		0.09		0.04		0.06	
Process safety events – tier 2	Event	1		0		1		2	
	Event / Million work hours	0.13		0		0.04		0.12	

**Remarks:**

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

People <sup>(6)</sup>	Unit	2018		2019		2020		2021	
		Male	Female	Male	Female	Male	Female	Male	Female
<b>GRI 405-1 Employees <sup>(1)</sup></b>									
Total number of employee	Person	1,482		1,637		1,749		1,799	
	Percent	1,089	393	1,222	415	1,329	420	1,351	448
	Percent	73	27	75	25	76	24	75	25
<b>Number of employees by level</b>									
<b>All Employees</b>									
• Executives <sup>(3)</sup>	Person	9	1	9	1	9	2	10	2
	Percent	90	10	90	10	82	18	83	17
• Management <sup>(4)</sup>	Person	94	58	94	63	90	64	93	69
	Percent	63	37	60	40	58	42	57	43
• Non-Management	Person	983	334	1,119	351	1,230	354	1,248	377
	Percent	75	25	76	24	78	22	77	23
<b>Permanent Contract</b>									
• Executives <sup>(3)</sup>	Person	8	0	8	0	8	1	8	1
• Management <sup>(4)</sup>	Person	96	55	90	60	87	61	90	66
• Non-Management	Person	983	334	1,118	351	1,229	354	1,248	376
<b>Temporary Contract <sup>(7)</sup></b>									
• Executives <sup>(3)</sup>	Person	1	1	1	1	1	1	2	1
• Management <sup>(4)</sup>	Person	1	3	4	3	3	3	3	3
• Non-Management	Person	0	0	1	0	1	0	0	1
<b>Number of employees by age group <sup>(1)</sup></b>									
• Below 30 years old	Person	261	80	374	70	492	79	471	83
• 30- 50 years old	Person	548	259	554	284	524	278	545	301
• Over 50 years old	Person	280	54	294	61	313	63	335	64
<b>Number of employees by area of work</b>									
<b>Permanent Contract</b>									
• Depot	Person	2	0	2	0	2	1	2	1
• Bangkok	Person	48	135	52	145	53	143	54	151
• Sriracha (Refinery)	Person	1,037	254	1,162	266	1,269	272	1,290	291
<b>Temporary Contract <sup>(7)</sup></b>									
• Depot	Person	0	0	0	0	0	0	0	0
• Bangkok	Person	1	4	4	4	3	4	4	5
• Sriracha (Refinery)	Person	1	0	2	0	2	0	1	0
<b>ATTRACTION</b>									
<b>GRI 401-1 New employees hired <sup>(1)</sup></b>									
Total number of new employees hired	Person	70		197		148		94	
		53	17	166	31	127	21	54	40
• Below 30 years old	Person	50	10	157	18	122	14	45	27
• 30- 50 years old	Person	3	7	8	13	5	7	8	12
• Over 50 years old	Person	0	0	1	0	0	0	1	1
Total new hire rate	Percent of total number of employees	4.72		12.03		8.46		5.23	
		4.87	4.33	13.58	7.47	9.56	5.00	4.00	8.93

People <sup>(6)</sup>	Unit	2018		2019		2020		2021	
		Male	Female	Male	Female	Male	Female	Male	Female
Ability to recruit employees <sup>(8)</sup>	Percent of the total number of position available for recruitment	92		100		100		90	
<b>RETENTION</b>									
<b>GRI 401-1 Employee Turnover <sup>(1), (5)</sup></b>									
Total turnover	Person	43		40		47		49	
• Below 30 years old	Person	27	16	32	8	30	17	37	12
• 30- 50 years old	Person	7	5	6	4	4	4	5	4
• Over 50 years old	Person	12	4	18	1	20	7	20	6
Turnover rate	Percent of total number of employees	2.91		2.44		2.69		2.72	
		2.48	4.0	2.62	1.93	2.26	4.05	2.74	2.68
Voluntary resignation	Percent of total number of employees	1.76		1.16		1.03		1.17	
		1.29	3.05	1.06	1.45	0.6	2.38	1.11	1.34
<b>DJSI 3.5.4 Employee Engagement</b>									
Employee engagement score	Percent	85		90		92		94	
	Percent	8.55	91	94	92	91	94	95	92
Employee satisfaction score	Percent	96		89		91		94	
	Percent	96	87	93	92	87	93	94	91
<b>GRI 401-3 Parental Leave</b>									
• Employee taken parental leave	Person	35		36		37		47	
		20	15	17	19	22	15	33	14
• Employee returned to work after parental leave	Person	35		36		37		47	
		20	15	17	19	22	15	33	14
• Rate of employee return to work and stay after using the parental leave	Percent of employees taken parental leave	100		100		100		100	
		100	100	100	100	100	100	100	100
<b>DEVELOPMENT</b>									
<b>GRI 404-1 Average Training Hours <sup>(1), (2)</sup></b>									
Total training hours	Hour	105,032		124,222		94,716		103,102	
		81,804	23,228	100,030	24,192	78,454	16,262	82,920	20,182
Average training hours for all employees	Hour/FTE/Year	69	58	75	58	56	38	57	46
• Average hours of training for executives <sup>(3)</sup>	Hour/FTE/Year	121	27	94	687	122	101	157	47
• Average hours of training for management <sup>(4)</sup>	Hour/FTE/Year	72	79	71	68	37	39	56	57
• Average hours of training for non-management employees	Hour/FTE/Year	68	55	75	54	56	38	56	43
<b>Individual Development Plan</b>									
Employees who developed Individual Development Plan (IDP)	Percent	100		100		100		100	
IDP Progress	Percent	99		90		100		100	
Employees who have a Career Path	Percent	98		98		98		99	
Rate of promotion <sup>(8)</sup>	Percent	15.36		17.15		13.87		20	
Expenses for employee development	Million THB	428		480		505		506	
	THB/FTE	270,632		276,305		275,483		265,873	

People <sup>(6)</sup>	Unit	2018	2019	2020	2021
<b>HUMAN RIGHTS</b>					
<b>Employee Grievances</b>					
Number of grievances about corruption	Case	0	0	0	0
• Resolved grievances	Case	0	0	0	0
• Grievances under investigation	Case	0	0	0	0
Number of grievances about labour practices	Case	1	0	0	0
• Resolved grievances	Case	1	0	0	0
• Grievances under investigation	Case	0	0	0	0
<b>Labour Union</b>					
Number of employees represented by a trade union	%	72	73.83	74.65	75.24

**Remarks:**

- (1) Consolidated data of employees assigned from external organizations, both permanent contract and temporary contract
- (2) The data excluded paid education leave funded by Thaioil-supported scholarships
- (3) Executives include CEO, president, executive vice president, and assistant executive vice president
- (4) Managements include vice president and section manager
- (5) Turnover rate includes employees with voluntary resignation, retired employees, employees who were asked to resign, employees laid off, and fatalities
- (6) Scope of reporting includes only Thaioil Public Company Limited
- (7) Employees on temporary contracts are full-time employees since Thaioil does not hire any part-time employees
- (8) Due to COVID-19 situation, the recruitment process and channel (e.g. PR in the university, internship of students who received the scholarship, etc) has been disrupted. Therefore, the recruitment process in 2021 has reached to the target group less than 2020.

Social and Community Development	Unit	2018	2019	2020	2021
Percentage of operations with implemented local community engagement, impact assessments, and/or development programs	Percent	100%	100%	100%	100%
Number of beneficiaries who used Thaioil's Health and Education Center in Sriracha	Visit	55,304	69,324	53,642	22,223
Community Engagement Score	Percent	97.25	93.32	94.89	96.74
Number of employee volunteer hours	Hour	8,376	10,416	16,470	12,488
Value of employee volunteering during paid working hours	Million THB	3.3	6.5	12.4	5.12
Management cost	Million THB	28.3	24	33	31
Value Chain Management	Unit	2018	2019	2020	2021
<b>GRI 308-1 and GRI 414-1 Suppliers</b>					
New suppliers that were screened using environmental and social criteria <sup>(1)</sup>	Percent	100	100	100	100
Suppliers that were assessed initial ESG risks	Percent	100	100	100	100
Ocean Loss Index	Percent by Volume	0.2	0.18	0.16	0.21 <sup>(2)</sup>
Supplier Satisfaction	Percent	96	93	94	93
Customer Management	Unit	2018	2019	2020	2021
<b>GRI 414-8 Customers</b>					
Customer Engagement <sup>(3)</sup>	Percent	96	96	98	94

**Remarks:**

- (1) Scope of reporting includes only all Tier-1 non-hydrocarbon suppliers in the approved list.
- (2) New crude oil tanks have been operated and test their pumping system in May 2021.
- (3) Scope of reporting covered customers of Thai Oil Public Company Limited, Thai Paraxylene Company Limited, and Thai Lube Base Public Company Limited

Environmental Performance		Unit	2018	2019	2020	2021
Refinery throughput <sup>(1)</sup>		Metric ton	15,132,708	14,600,280	13,478,448	13,664,652
<b>Energy Management and Greenhouse Gases <sup>(2), (4)</sup></b>						
Total energy consumption <sup>(2)</sup>	Million GJ	31.6	30.7	27.5	27.75	
Non-Renewable Energy	Million GJ	31.6	30.7	27.5	27.75	
Refinery energy intensity	GJ/ton throughput	2.09	2.1	2.04	2.03	
Total fuel consumption <sup>(2)</sup>	Million GJ	58.89	56.01	50.26	52.76	
Refinery fuel consumption intensity	GJ/ton throughput	3.89	3.84	3.73	3.86	
• Natural gas	Million GJ	37.28	36.39	33.10	33.32	
• Fuel oil	Million GJ	3.19	2.91	5.20	4.30	
• Fuel gas	Million GJ	17.48	15.39	10.85	14.07	
• Coke	Million GJ	0.92	1.28	1.09	1.04	
• LPG	Million GJ	Less than 0.01	Less than 0.01	Less than 0.01	Less than 0.01	
• Diesel	Million GJ	0.015	0.029	0.021	0.015	
• 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	1,053,508	987,424	972,237	980,290	
Electricity purchased from external supplier	Megawatt Hour	0	0	0	0	
Electricity sold <sup>(4)</sup>	Megawatt Hour	1,580,035	1,580,492	1,556,176	1,548,619	
Reductions in energy consumption	GJ	562,075	1,396,728	746,264	312,741	
Investments in renewable energy	Million THB	1,381	1,374	1,442	1,413	
Direct Greenhouse Gas Emissions (Scope 1) <sup>(3)</sup>	Million ton CO <sub>2</sub> equivalents	3.49	3.31	3.02	3.15	
Indirect Greenhouse Gas Emissions (Scope 2) <sup>(3)</sup>	Million ton CO <sub>2</sub> equivalents	0	0	0	0	
Greenhouse gas intensity (Scope 1 and 2)	Ton/throughput	0.23	0.23	0.22	0.23	
Greenhouse gas emissions reductions (Scope 1) from the energy efficiency improvement projects	Ton	32,151	84,265	51,084	17,545	
Methane (CH <sub>4</sub> ) emission	Ton	65.20	61.59	60.73	61.20	
<b>Indirect Greenhouse Gas Emissions (Scope 3) <sup>(3)</sup></b>						
• Business partners: Landfilling industrial waste	Million ton CO <sub>2</sub> equivalents	542	1,014	0	0	
• Business partners: Crude oil losses during marine transportation	Million ton CO <sub>2</sub> equivalents	2,121	1,268	1,346	1,573	
• Customers: Fuel	Million ton CO <sub>2</sub> equivalents	24.8	27.2	26.5	26.8	
<b>Air Emissions <sup>(5), (6)</sup></b>						
• Nitrogen oxide (NOX) emissions	Tons	4,497	4,360	4,526	4,527	
• Sulfur oxide (SOX) emissions	Tons	4,140	4,272	6,612	5,197	
• Volatile organic compounds (VOCs) emissions	Tons	1,427	1,348	1,297	1,270	
<b>Waste Management (GRI 306-3, 306-4, 306-5 (2020))</b>						
Total waste generated	Ton				5,889	
<b>Total waste generated and already managed</b>	<b>Ton</b>	<b>13,013</b>	<b>14,916</b>	<b>10,820</b>	<b>5,862</b>	
• Total hazardous waste generated	Ton	12,707	12,452	8,172	5,078	
• Total non-hazardous waste generated	Ton	306	2,464	2,648	784	
<b>Total waste leftover onsite at the end of the year</b>	<b>Ton</b>				<b>27</b>	
• Total hazardous waste leftover onsite at the end of the year	Ton				25	
• Total non-hazardous waste leftover onsite at the end of the year	Ton				2	

Environmental Performance		Unit	2018	2019	2020	2021
Total waste diverted from disposal	Ton	12,641	13,923	10,786	5,856	
Onsite	Ton	0	0	0	0	
Total Hazardous waste diverted from disposal	Ton	0	0	0	0	
• Preparation for reuse	Ton	0	0	0	0	
• Recycling	Ton	0	0	0	0	
• Recovery	Ton	0	0	0	0	
Total Non-hazardous waste diverted from disposal	Ton	0	0	0	0	
• Preparation for reuse	Ton	0	0	0	0	
• Recycling	Ton	0	0	0	0	
• Recovery	Ton	0	0	0	0	
Offsite	Ton	12,641	13,923	10,786	5,856	
Total Hazardous waste diverted from disposal	Ton	12,517	11,787	8,167	5,078	
• Preparation for reuse	Ton	0	0	0	0	
• Recycling	Ton	1,425	4,615	1,312	944	
• Recovery	Ton	11,092	7,173	6,855	4,134	
Total non-hazardous waste diverted from disposal	Ton	124	2,136	2,619	778	
• Preparation for reuse	Ton	0	0	0	0	
• Recycling	Ton	57	2,086	2,448	432	
• Recovery as an alternative fuel	Ton	67	49	171	346	
Total waste directed to disposal	Ton	372	993	34	6	
Onsite	Ton	0	0	0	0	
Total weight of hazardous waste directed to disposal	Ton	0	0	0	0	
• Incineration (with energy recovery)	Ton	0	0	0	0	
• Incineration (without energy recovery)	Ton	0	0	0	0	
• Landfilling	Ton	0	0	0	0	
• Other disposal operations	Ton	0	0	0	0	
Total weight of non-hazardous waste directed to disposal	Ton	0	0	0	0	
• Incineration (with energy recovery)	Ton	0	0	0	0	
• Incineration (without energy recovery)	Ton	0	0	0	0	
• Landfilling	Ton	0	0	0	0	
• Other disposal operations	Ton	0	0	0	0	
Offsite	Ton	372	993	34	6	
Total weight of hazardous waste directed to disposal	Ton	190	665	34	0	
• Incineration (with energy recovery)	Ton	0	0	0	0	
• Incineration (without energy recovery)	Ton	143	427	6	0	
• Landfilling	Ton	47	237	0	0	
• Other disposal operations	Ton	0	0	28	0	
Total weight of non-hazardous waste directed to disposal	Ton	182	328	0	6	
• Incineration (with energy recovery)	Ton	0	0	0	6	
• Incineration (without energy recovery)	Ton	0	133	0	0	
• Landfilling	Ton	182	195	0	0	
• Other disposal operations	Ton	0	0	0	0	
Oil and Chemical Spills <sup>(7)</sup>						
• Significant oil and chemical spills on land	Incident	0	0	0	0	
• Significant oil and chemical spills at sea	Incident	0	0	0	0	

Environmental Performance		Unit	2018	2019	2020	2021
<b>Compliance with Environmental Laws and Regulations</b>						
• Fines for non-compliance with environmental laws and regulations	THB	0	0	0	0	0
• Number of incidents of non-compliance with environmental laws and regulations	Incident	0	0	0	0	0

Environmental Performance	Unit	Water				Areas with water stress
		2018	2019	2020	2021	
<b>Water<sup>(8)</sup></b>						
Water withdrawal by source	Total Seawater <sup>(9)</sup>	Million m3	17.96	17.96	18.41	18.19
	• Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million m3	0	0	0	0
	• Other water (>1,000 mg/L Total Dissolved Solids)	Million m3	17.96	17.96	18.41	18.19
	Total water withdrawal from other sources	Million m3	4.98	4.86	3.34	3.88
	• Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million m3	4.98	4.86	3.34	3.88
	• Other water (>1,000 mg/L Total Dissolved Solids)	Million m3	0	0	0	0
	Total third-party water withdrawal by withdrawal source	Surface water	Million m3			0
		Ground water	Million m3			0
		Seawater	Million m3			0
		Produced water	Million m3			0
Total Water Consumption	From all water sources	Million m3	22.94	22.82	21.75	22.07
Water discharge by destination	Discharged into the sea	Million m3	18.60	18.13	17.43	18.01
Total water discharge	All discharge destinations	Million m3	18.60	18.13	17.43	18.01
Water discharge by level of treatment	Freshwater (≤1,000 mg/L Total Dissolved Solids)	Million m3	0	0	0	0
	Other water (>1,000 mg/L Total Dissolved Solids)	Million m3	18.60	18.13	17.43	18.01
Water consumption	Total water consumption	Million m3	4.34	4.69	4.33	4.05

**Remarks:**

- (1) Refinery Throughput includes crude oil and other feedstock
- (2) Total energy consumption covers TOP, TPX, TLB, LABIX, and TOP SPP. The amount of fuel, steam, and electricity was accounted as per GRI Standard 302. All energy conversion factors were specific value from Thaioil and Subsidiaries' laboratory.
- (3) Thaioil and Subsidiaries follow standard statistical reporting of PTT Group in accordance with WBCSD GHG Protocol. The greenhouse gases include CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. For other indirect GHGs (scope 3) reported covering employee air travel.
- (4) There was no steam sold to outside the organization.
- (5) Thaioil and Subsidiaries follow the Shell International Practice Standard (2007) in monitoring occupational health and safety and environmental performance.
- (6) Thaioil and Subsidiaries do not purchase ozone depleting substances including CFCs, HCFCs, Halons, and Methyl bromide.
- (7) Oil and chemical spill greater than 1 Barrel to sea and 100 Barrel to land are considered significant.
- (8) Data excludes water consumption in office building, which has very small volume compared to water consumption in production process.
- (9) Seawater withdrawal and discharge include excess seawater that has been desalinated from the desalination unit and discharged as freshwater.

## AWARDS AND RECOGNITIONS



01

Thaioil was awarded the “2021 S&P Global Sustainability Award” and recognized as a global leading organization in sustainability for seven years

8<sup>th</sup> February 2021

Thai Oil Public Company Limited obtained “gold class” status in the Oil and Gas Refining and Marketing industry from the annual sustainability assessment for seven years. This recognition reflects Thaioil’s ability to manage economic, social, and environmental issues to meet international sustainability standards.



02

Thaioil received regional recognition for excellence in corporate governance, and was ranked as one of the top twenty publicly listed companies in the ASEAN region with excellent corporate governance.

11<sup>th</sup> February 2021

Thai Oil Public Company Limited was awarded the “ASEAN Top 20 PLCs Award” – an award for the top 20 highest scoring publicly listed companies in the ASEAN region. Thaioil was also awarded the “Country Top 3 PLCs (Thailand) Award”, which was given to the top listed companies with the highest scoring in each country.



03

Thaioil was awarded the “2021 Certificate of Honor for Role Model Organizations in Greenhouse Gas Reduction”

31<sup>st</sup> August 2021

Thai Oil Public Company Limited was awarded the “2021 Certificate of Honor for Role Model Organizations in Greenhouse Gas Reduction” by the Ministry of Natural Resources and Environment and the Thailand Greenhouse Gas Management Organization, or TGO, for the Company’s participation in the Low Emission Support Scheme (LESS). This award honors companies that have demonstrated leadership in reducing greenhouse gas emissions. Thaioil received this award specifically for our three greenhouse gas reduction projects. Meanwhile, TOP SPP Company Limited also had its carbon credits certified through the Thailand Voluntary Emission Reduction Program (T-VER).



04

Thaioil was awarded the “2021 Outstanding Low Carbon and Sustainable Business Award”

15<sup>th</sup> September 2021

Thai Oil Public Company Limited was awarded the “2021 Outstanding Low Carbon and Sustainable Business Award” by the Thailand Greenhouse Gas Management Organization. This award recognizes sustainable businesses that demonstrate a commitment to manage climate change risks and reduce greenhouse gas emissions in line with national sustainability targets.



05

Thaioil was awarded as the “2021 Role Model Organization on Human Rights” for large businesses for the second consecutive year

29<sup>th</sup> September 2021

Thai Oil Public Company Limited was awarded the “2021 Role Model Organization on Human Rights” for large businesses by the Rights and Liberties Protection Department. This award recognizes organizations that demonstrate leadership in human rights and are role model examples of good human rights practices. The award serves to encourage businesses to follow good practices in respecting human rights and running business sustainably.



06

Thaioil was listed as one of the 2021 “sustainable stocks” in Thailand Sustainability Investment index (THSI) for the seventh consecutive year

4<sup>th</sup> October 2021

Thai Oil Public Company Limited was selected as one of the companies with sustainable returns for the seventh consecutive year. This reflects the Company’s continued efforts in developing our business sustainably and our capacity to adapt and respond to future business opportunities as we continue our path towards sustainably growing into a 100<sup>th</sup> year sustainable organization.

## AWARDS AND RECOGNITIONS



07

Thaioil was awarded the “2021 CSR-DIW Continuous Award” for the thirteenth consecutive year

27<sup>th</sup> October 2021

Thai Oil Public Company Limited received the “2021 CSR-DIW Continuous Award”, marking the 13<sup>th</sup> consecutive year that the Company has been awarded with this recognition. The award is given by the Department of Industrial Works of the Ministry of Industry and is part of an initiative to promote corporate social responsibility and sustainability in industry.



08

Thaioil was awarded the “2021 Sustainability Award of Honor” for the fourth consecutive year

3<sup>rd</sup> November 2021

Thai Oil Public Company Limited was awarded the 2021 Sustainability Award of Honor, marking the fourth consecutive year that the Company has been awarded with this recognition. This award is part of the Sustainability Excellence SET Awards and is given by the Stock Exchange of Thailand and the Money and Banking magazine.



09

Thaioil was awarded the “2021 ‘Top Management’ Thailand Top Company Award”

18<sup>th</sup> November 2021

Thai Oil Public Company Limited was awarded the “2021 ‘Top Management’ Thailand Top Company Award”. This award is given to organizations with outstanding performance in management, including in organizational transformation and exceptional financial performance. The award serves to celebrate Thai businesses with thought leadership and highlights role model organizations that other businesses can aspire to follow.



10

Thaioil received three regional awards at the 11<sup>th</sup> Asian Excellence Award 2021

22<sup>nd</sup> November 2021

Mr. Wirat Uanarumit, Chief Executive Officer and President of Thai Oil Public Company Limited, was presented with the “Asia’s Best CEO (Investor Relations) Award” for the fifth consecutive year at the 11<sup>th</sup> Asian Excellence Award 2021 organized by the Corporate Governance Asia magazine. Meanwhile, Mrs. Wanida Boonpiraks, Executive Vice President for Finance and Accounting at Thai Oil Public Company Limited, was presented with the “Asia’s Best CFO (Investor Relations) Award” for the third consecutive year and the “Best Investor Relations by Company Award” for the eighth consecutive year.



11

Thaioil was awarded the “2021 Asset ESG Corporate Award” for the second consecutive year

6<sup>th</sup> December 2021

Thai Oil Public Company received the Asset ESG Corporate Platinum Award for the second consecutive year, and the Best Investor Relations Team Award at the 2021 Asset ESG Corporate Award. The award is organized by The Asset magazine, the leading financial magazine in Asia.



12

Thaioil was awarded the “Sustainability Disclosure Award” for the third consecutive year

17<sup>th</sup> December 2021

Thai Oil Public Company Limited was awarded the “2021 Sustainability Disclosure Award” by the Thaipat Institute. This marks the third consecutive year that the Company has been recognized for our continued commitment to transparency and disclosure of information related to sustainability performance – including environmental, social, and governance issues – to the public and our stakeholders.



## LRQA Independent Assurance Statement

### Relating to Thai Oil Public Company Limited's Environmental and Social Disclosures within the Integrated Report for the calendar year 2021

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 2021 ("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., TLB, TPX, TES, LABIX, and TOP SPP and specifically the following requirements:

- Reviewing whether the selected environmental and social disclosures within the Report have taken account of the GRI Sustainability Reporting Standards
- Evaluating the reliability of data and information, based on the latest version of the GRI standard applicable to the selected environmental and social disclosures listed below:
  - Environmental: GRI disclosure 302-1, 303-3, 303-4, 305-1, 305-2, 305-7, 306-3 (2016), 306-3, 360-4, 306-5
  - Social: GRI disclosure 403-9a and 403-9b, 403-10a and 403-10b

Note: For safety performance data (disclosure 403-9, 403-10), it also covered TOP's operations and activities in Bangkok, and 3 expansion projects e.g., CFP Concurrence, CFP Brown field, C-COT within TOP's Operation.

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

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

#### LRQA's Opinion

Based on LRQA's approach nothing has come to our attention that would cause us to believe that TOP has not, 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 continues to maintain its established stakeholder engagement processes; covering all key stakeholders who impact on TOP. The data and information collected from this process, then informs TOP's ESG principles and values. For example: setting policy commitment to improve sustainability performance in climate change and circular economy.
- Materiality: Assessment of materiality is well established; having been done right from the beginning of TOP's sustainable development practises, including sustainability reporting. However, TOP intends to alter the methodology of assessing materiality and gather more data. To do this effectively, we believe that TOP should introduce their new methodology in a structured manner to ensure it does elaborate and justify material issues.
- Responsiveness: TOP has implemented policy and procedures to address stakeholders' needs and expectations. For example: carbon net-zero – TOP has set its short-term target to reduce GHGs by 4% by 2023. However, we believe in the next reporting cycle that TOP should also disclosure its long-term commitment(s) to addressing climate change.
- Reliability: TOP has established and maintained, at an aggregated level, a consistent data collection system. However, we believe that TOP should consider including for independent verification other sustainability datasets, such as issues related to inequality, to further improve their credibility.

#### 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 Tanasuthisiri  
LRQA Lead Verifier

On behalf of LRQA Ltd.  
LRQA (Thailand) Limited  
22nd Floor, Sirinrat Building, 3388/78 Rama IV Road  
Klongton, Klongtoey, Bangkok 10110 THAILAND

LR reference: BGK48597661088975

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# GRI CONTENT INDEX/ UNGC PRINCIPLES COP and TCFD FRAMEWORK



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## TOPIC SPECIFIC DISCLOSURE

Thaioil Sustainability Material Topics	GRI Topics	Disclosures	Page or Website	Comments/ Omissions	External Assurance
Environment Impact Management	GRI 103: Management Approach 2016	103-1 103-2 103-3	38 39-46 39-46		
	GRI 302: Biodiversity 2016	304-2	41		
	GRI 306: Effluents and Waste 2016	306-3	42, 133-134	Yes	
	GRI 307: Environmental Compliance 2016	307-1	43, 133-134		
	GRI 305: Emissions 2016	305-7	44-46, 133	Yes	
	GRI 103: Management Approach 2016	103-1 103-2 103-3	48 49-55 49-55		
	GRI 305: Emissions 2016	305-1 305-2 305-3 305-4 305-6	54-55, 133 54-55, 133 54-55, 133 54-55, 133 54-55, 133	Yes Yes	
	G4 Sector Disclosures for Oil and Gas	G4-EC2	50-53		
	GRI 103: Management Approach 2016	103-1 103-2 103-3	56 57-67 57-67		
	GRI 302: Energy 2016	302-1	59-62, 133	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
Circular Economy	GRI 303: Water and Effluents 2018	302-30GSD 302-4 302-5 303-1 303-2 303-3	62 59-62, 133 59-62, 133 57-59, 135 57-59, 135 57-59, 135		
	GRI 303: Water and Effluents 2018	303-4 303-5	57-59, 135 57-59, 135	The standard, methodologies and consumptions used to calculate water withdrawal are not reported.	Yes
	GRI 306: Waste 2020	306-1 306-2 306-3 306-4 306-5	66-67, 133-134 66-67, 133-134 66-67, 133-134 66-67, 133-134 66-67, 133-134		Yes Yes
	GRI 103: Management Approach 2016	103-1 103-2 103-3	70 71-75 71-75		Yes
	GRI 402: Labour Management Relations 2016	402-1	74, 132		
	GRI 405: Diversity and Equal Opportunity 2016	405-1	74, 130-131		
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## TOPIC SPECIFIC DISCLOSURE

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	GRI 403: Occupational Health and Management System 2018	403-1	76-77		
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		403-7	77-79		
		403-8	77-79		
		403-9	80-81, 128-129	Yes	
		403-10	81, 128-129	Yes	
	G4 Sector Disclosures for Oil and Gas	G4-OG13	80-81, 128-129		
Human and Organization Development	GRI 103: Management Approach 2016	103-1	82		
		103-2	83-87		
		103-3	83-87		
	GRI 401: Employment 2016	401-1	83, 85, 130-131		
		401-2	86-87		
		401-3	131		
	GRI 404: Training and Education 2016	404-1	83, 87		
		404-2	84-85		
		404-3	87, 131		
Corporate Social Responsibility	GRI 103: Management Approach 2016	103-1	88		
		103-2	89-97		
		103-3	89-97		
	GRI 413: Local Communities 2016	413-1	89-97		
		413-2	89-97		
Fight Against Corruption	GRI 103: Management Approach 2016	103-1	100-101		
		103-2	101-105		
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	GRI 205: Anti-Corruption 2016	205-1	101-105		
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Digital Transformation	GRI 103: Management Approach 2016	103-1	106		
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Innovation and Research & Development	GRI 103: Management Approach 2016	103-1	112		
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Customer Relations Management	GRI 103: Management Approach 2016	103-1	118-119		
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ESG Risk in Supply Chain Management	GRI 103: Management Approach 2016	103-1	120		
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	GRI 308: Supplier Environmental Assessment 2016	308-1	124-125		
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## TOPIC SPECIFIC DISCLOSURE

Thaioil Sustainability Material Topics	GRI Topics	Disclosures	Page or Website	Comments/ Omissions	External Assurance
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Business Performance	GRI 201: Economic Performance 2016	201-1	5, 12-13		

## UNGCR PRINCIPLES COP

### UNITED NATIONS GLOBAL COMPACT PRINCIPLES

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	Principle 2	Businesses should make sure that they are not complicit in human rights abuses	70-81
Labour	Principle 3	Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining	70-81
	Principle 4	The elimination of all forms of forced and compulsory labour	70-81
Environment	Principle 5	The effective abolition of child labour	70-81
	Principle 6	The elimination of discrimination in respect of employment and occupation	70-81
Environment	Principle 7	Businesses should support a precautionary approach to environmental challenges	48-67
	Principle 8	Undertake initiatives to promote greater environmental responsibility	63-65
Anti-corruption	Principle 9	Encourage the development and diffusion of environmentally friendly technologies	63-65
	Principle 10	Businesses should work against corruption in all its forms, including extortion and bribery	100-105

## TCFD FRAMEWORK

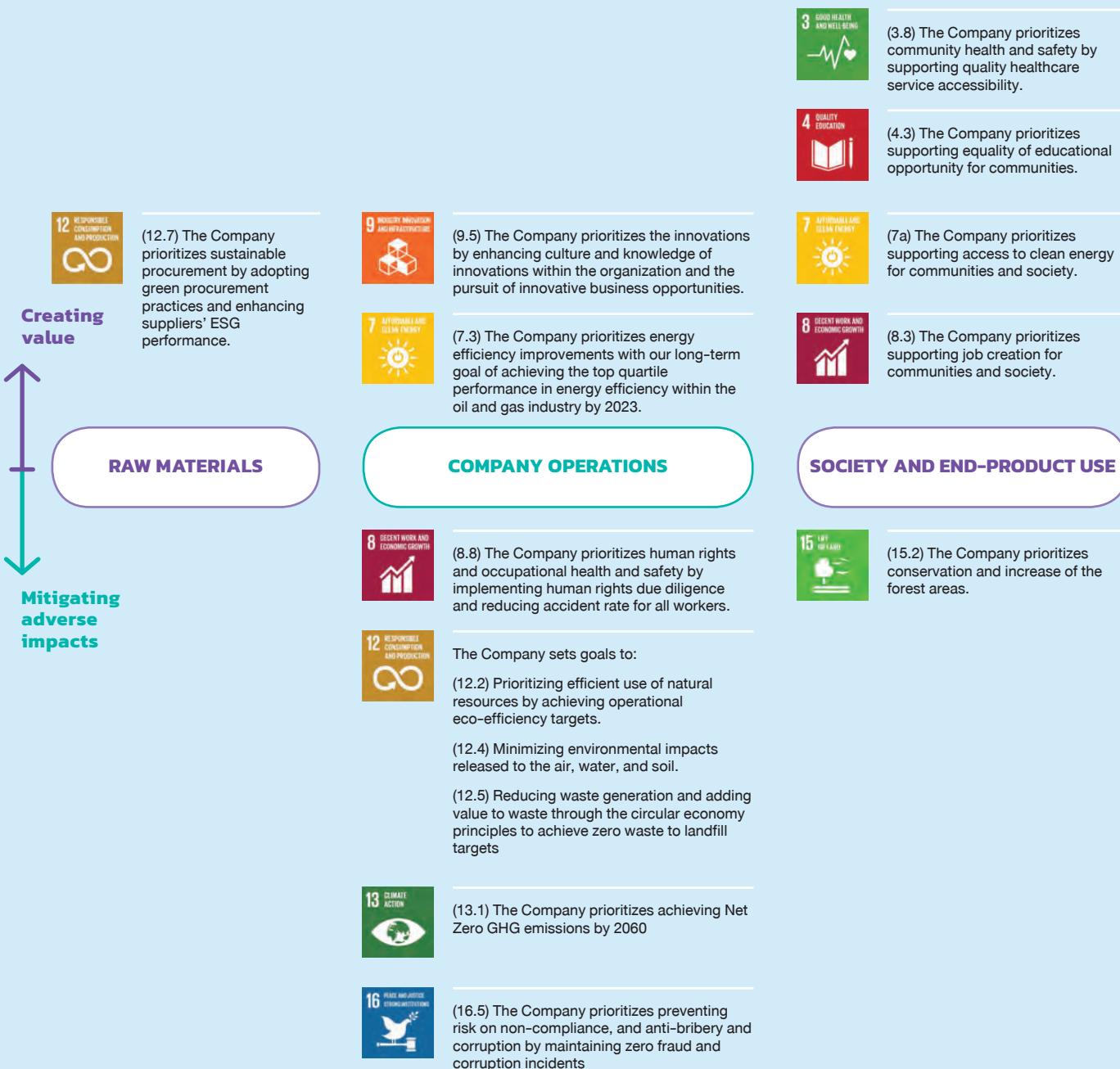
	Recommendation	Recommended Disclosure	Page
Governance	Disclose the organization's governance of climate-related risks and opportunities.	a) Describe the board's oversight of climate-related risks and opportunities b) Describe management's role in assessing and managing climate-related risks and opportunities	30, 49 49
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.	50 50-53 50-53
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	50-53 51-53 30, 49-50
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	54-55 53-54 54

# SDGs PROGRESS



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

## Thaioil's Commitment



## Progress 2021

In 2021, Thaioil has reviewed 9 of the 17 goals in line with the SDG goals, of which 14 are targets. The progress details are shown in the table below.

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2021	More Information
<b>SDG 3: Good Health and Well-being</b> 	3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality, and affordable essential medicines and vaccines for all.	To support public health service accessibility of communities in Laem Chabang district, Chonburi Province, and other remote communities.	<p>Thaioil Group's Health and Learning Center for Community:</p> <ul style="list-style-type: none"> <li>• 22,223 beneficiaries accessed to the Thaioil Group's Health and Learning Center</li> <li>• 1,091 beneficiaries participated in the Thaioil's Dental Clinic Project.</li> </ul>	Corporate Social Responsibility, pages 88-97
<b>SDG 4: Quality education and lifelong learning opportunities for all</b> 	4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university.	To support educational opportunity for community members of every gender and age, and promote the development of the quality of basic education.	<p>Sponsored the employment of 56 teaching assistants for each participating school, total 14 schools, in the leadership project for sustainable educational development through Restart Thailand program.</p> <p>Developed 2 change-maker teachers teaching science and English through Teach for Thailand program.</p>	Corporate Social Responsibility, pages 88-97
<b>SDG 7: Affordable and Clean Energy</b> 	<p>7.3 Double the global rate of improvement in energy efficiency.</p> <p>7a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.</p>	<p>To be ranked as the top quartile of Energy Intensity Index (EII) among the global oil and gas industry by 2023.</p> <p>To support accessibility to clean energy for local communities and other remote communities.</p>	<p>Refinery Energy Intensity Index (EII) at 85.3 and ranked among leading companies in the oil and gas industry globally.</p> <p>Installed solar power systems for Laem Chabang Hospital with a capacity of 80.24 kW.</p>	<p>Circular Economy, pages 56-67</p> <p>Corporate Social Responsibility, pages 88-97</p>

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2021	More Information
<b>SDG 8: Decent Work and Economic Growth</b> 	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small and medium-sized enterprises, including through access to financial services	To support job creation and sustainable self-reliance in local communities and other remote communities through social enterprise projects	Organized 2 job training courses for Laem Chabang communities, with a total of 36 community members attended. The activity was part of the increased incomes project: Year 3 Project.	Corporate Social Responsibility, pages 88-97
	8.8. Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.	To achieve a total recordable injury frequency rate (TRIR) among the first 10 % of the oil and gas industry by 2022.	TRIR at 0.30 cases per million working hours for all workers, better than the 2021 target of less than 0.35 cases per million working hours, and continued to maintain performance in the leading 10 % of oil and gas companies.	Health and Safety, pages 76-81
		To maintain zero incident of Process Safety: Loss of Primary Containment (LOPC) Tier 1.	One LOPC Tier 1 event, equivalent to 0.06 cases per million working hours.	
		To implement the human rights due diligence process of Thaioil operations and to assess human rights risks for all critical suppliers.	Human rights risk assessment covered 100% of the business activities of Thaioil Group and of suppliers, and all risks have been assigned with adequate mitigation measures.	Human Rights, pages 70-75
<b>SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.</b> 	9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, including encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	To promote an innovative culture and enhance business opportunities in the area of innovation.	Granted patent applications for 4 items in total	Innovation, Research and Development Management pages 112-117
			Thaioil has 14 environmentally friendly products, which contributed to 41% of total sales revenue of Thaioil Group.	Circular Economy, pages 56-67

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2021	More Information
<b>SDG 12: Responsible consumption and production</b> 	12.2 Achieve the sustainable management and efficient use of natural resources.  12.4 Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment.  12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse.  12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities.	To achieve a business target following the circular economy principles for cost reduction and efficient consumption of limited resources by operation.  To achieve the target of maximization of efficiency natural resource consumption in order to minimize impacts to environment and social.  To achieve a business target following the circular economy principles for efficient consumption of limited resources and waste generation reduction.  To promote sustainable green procurement in the organization and enhance environmental, social and governance (ESG) practices with suppliers.	37% of freshwater consumption were replaced by distilled water from desalination.  Ocean loss index of oil loss during marine transportation at 0.21% by volume.  4,527 tons of NO <sub>x</sub> emissions.  5,197 tons of SO <sub>x</sub> emissions.  1,270 tons of VOCs emissions.  Zero significant oil and chemical spills according to target.  Zero waste to landfill.	Circular Economy, pages 56-67  ESG Risk in Supply Chain Management, pages 120-126  Environmental Impact Management, pages 38-46  Circular Economy, pages 56-67  ESG Risk in Supply Chain Management, pages 120-126  Circular Economy, pages 56-67

UN Sustainable Development Goals	UN Sustainable Development Goal Targets	Corresponding Thaioil Targets	Progress in 2021	More Information
<b>SDG 13: Climate Action</b> 	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.	By 2060, Move towards a Net Zero Emissions Organization through using Decarbonisation Technology and Carbon Removal in order to capture the residual carbon, as well as seeking for the investment opportunities in businesses supporting the Net Zero Emissions goal.	GHG emission intensity at 0.23 ton carbon dioxide equivalent per ton of throughput; 13.58% GHG reduction from Business As Usual.  810,593 tons of carbon dioxide equivalents of avoided emissions from use of low carbon products.	Climate Change Risk, pages 48-55  Circular Economy, pages 56-67
<b>SDG 15: Life On Land</b> 	15.2 Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	To promote Nature-Based Solutions through the restoration, conservation, and increasing areas of forest and mangrove which enhance creating a balanced ecosystem in the community which also supports Thaioil group's net zero GHG emission target.	Reduced GHG emissions from forestation, equivalents to 2 tons of carbon dioxide.	Corporate Social Responsibility, pages 88-97
<b>SDG 16: Peace, Justice, and Strong Institutions</b> 	16.5 Substantially reduce corruption and bribery in all their forms.	To have a clear, transparent, and fair compliance system in place and to maintain zero corruption and fraud incidents as well as to take position of no corruption acceptance in any cases.	Zero case of non-compliance with rules and regulations or conduct that may lead to corruption and bribes.  100% of employees responded to the annual conflict of interest form, and no conflict of interest was found.	Fight Against Corruption, pages 100-105

# Survey of Reader's Opinion

Responses collected from the 2021 Integrated Report Survey of Reader's Opinion will be used to improve and develop the next annual integrated report.

Thank you for your cooperation.



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

**1 Please mark the option that describes you best.**

<input type="checkbox"/> Shareholder/Investor	<input type="checkbox"/> Customer	<input type="checkbox"/> Employee	<input type="checkbox"/> Community member living around Thaioil's operation
<input type="checkbox"/> Supplier	<input type="checkbox"/> Government	<input type="checkbox"/> Academia	<input type="checkbox"/> Student
<input type="checkbox"/> Media	<input type="checkbox"/> Other (Please specify) .....		

**2 How did you receive or access the 2021 Integrated Report?**

<input type="checkbox"/> Shareholders' Annual General Meeting	<input type="checkbox"/> Seminar/Exhibition/Lecture	<input type="checkbox"/> Thaioil employees
<input type="checkbox"/> Thaioil Website	<input type="checkbox"/> Other (Please specify) .....	

**3 What is your objective for reading the 2021 Integrated Report?**

<input type="checkbox"/> To gain information about Thaioil	<input type="checkbox"/> To support an investment decision	<input type="checkbox"/> For research and education purposes
<input type="checkbox"/> To prepare your own Sustainability and/or Integrated Report	<input type="checkbox"/> Other (Please specify) .....	

**4 Please rate your satisfaction with the format and presentation of the 2021 Integrated Report.**

Language that is clear and easy to understand	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement
Presentation of images, graphs, and tables	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement
Report design	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement
Overall satisfaction with the report	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement

**5 Please rate your interest in each chapter of the 2021 Integrated Report.**

Group Overview	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Business Model	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Stakeholders and Material Matters	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Business Strategy Outlook	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Corporate Governance and Sustainability	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Enhance Environment	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Engage Society	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Ensure Good Governance and Economic Resilience	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Performance Summary	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
Awards and Recognitions	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested
SDGs Progress	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Uninterested

**6 Please rate the 2021 Integrated Report on its reliability and completeness.**

Your understanding of Thaioil's material issues	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement
The relevance of the reported sustainability performance with Thaioil's sustainability strategy	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement
The appropriateness and reliability of the reported contents	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement
The reported contents address your questions and concerns	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low	<input type="checkbox"/> Improvement

**7 Do you think that the 2021 Integrated Report covers all of Thaioil's material sustainability issues?**

Yes       No

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

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**8 Please provide other comments and suggestions for the improvement of Thaioil's next annual integrated report.**

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Please address this survey to:



**Group Company Secretary  
and Sustainability Function  
Thaioil Public Company Limited**

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42/1 Moo 1 Sukhumvit Road Km.124, Tungsakla,  
Sriracha, Chonburi 20230 Thailand

Tel. : +66(0)-3840-8500, +66(0)-3835-9000

Fax. : +66(0)-3835-9019

E-mail : [sustainability@thaioilgroup.com](mailto:sustainability@thaioilgroup.com)

Website : [www.thaioilgroup.com](http://www.thaioilgroup.com)



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**Bangkok Office**

555/1 Energy Complex Building A, 11<sup>th</sup> Floor,  
Vibhavadi Rangsit Road, Chatuchak, Chatuchak,  
Bangkok 10900, Thailand  
Tel : +66(0)-2797-2999, +66(0)-2299-0000  
Fax : +66(0)-2797-2970

**Sriracha Office and Refinery**

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