



## 2023 MITR PHOL

Task Force on Climate-related Financial  
Disclosure – (TCFD) Report



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## Message from Chairman of the Mitr Phol Group



*Buntoeng Vongkusolkrit*  
*Chairman of Mitr Phol Group*

Over the past year, 2022, we have continued to face significant issues that need urgent solutions, especially global climate change, which has intensified extreme weather and driven an increase in the number of weather-related disasters. Constant greenhouse gas emissions are the main contributor to global warming, which is resulting in impacts on the environmental system, society, and economy. Moreover, the agenda on which the world community prioritizes and commits as an urgent global problem requiring a global solution

Since agriculture serves as an upstream resource for the Mitr Phol Group company, we realize that the effects of climate change also have an impact on the value chain, and it is our corporate responsibility. Therefore, to drive change and lessen the effects that occur in the world, Mitr Phol Group has thrived in running a business with a commitment to society and care for the environment, also based on the circular economy model.

For Mitr Phol Group's achievement, we have planned sustainable development operations in line with the United Nations Sustainable Development Goals (SDGs) and aim to be a carbon-neutral organization by 2030 and net zero greenhouse gas emissions by 2050.

2022 is the year we achieve sustainability by embedding the concept "From Waste to Value Creation" into the development of raw materials throughout the supply chain, resulting in quality cane that will eventually lead to high-quality sugar. Finally, this will bring about a variety of bio-products to replace petroleum-based products, responding to eco-friendly consumption. In addition, we have applied the innovation to enhance the renewable energy business by developing ethanol use from the automotive industry to support bio-based aviation fuel, or Sustainable Aviation Fuel (SAF).

Furthermore, Mitr Phol Group's human rights operation consists of Human Rights Due Diligence (HRDD), following the United Nations Guiding Principles on Business and Human Rights (UNGP) as a framework to magnify the explicit operation and to impart the knowledge and understanding of human rights to Mitr Phol personnel constantly, to drive the action on human rights to all stakeholders.

We believe that running a business with clear goals goes hand in hand with sustainable development. Helps increase competitive ability and adapt to changes that may occur from climate change along with creating hope that the world will be able to continue sustainably

On behalf of Mitr Phol Group I would like to thank everyone who supports our business operations. and work together to continuously drive sustainability operations.



## Mitr Phol Group in Action to respond to Climate Change

As agricultural-based businesses, Mitr Phol Group realized that climate change causes not only unusual weather but also creates an unavoidable impact through our value chains. Therefore, climate change has been embraced as playing an important role in our maternity since 2016, which is part of the environmental pillar of sustainable development and also in risk assessment.

### *Mitr Phol's Climate Action*

To tackle climate change, the group has declared a road map toward net zero aligned with the 1.5 pathway. The roadmap was outlined across (1) the near-term target of carbon neutrality by 2030 by cutting off 50% of the GHG emissions and then achieving carbon neutrality by offset all residue emissions; and (2) the long-term target of net zero by 2050. The ambitions to achieve net zero were targeted across key areas, including scaling up the use of renewable energy, increasing the bio-circular green product portfolio, applying modern farming techniques, and investing in technology such as carbon capture, storage, and utilization.



*Mitr Phol Road Map To Net Zero by 2050*



# Mitr Phol's TCFD Report

## About This Report

The year 2022 was our early years of initiative for the TCFD recommendation. The framework was introduced to all business units for assessing climate change-related risks and opportunities through a climate change scenario.

This 2023 TCFD report is an update on progress in accordance with the TCFD recommendation, including four sections as follows:

- Government
- Strategy
- Risk Management
- Metrics and Target

In the report, we describe the impact of climate change on business through risks and opportunities and update the change in risk management, such as the embedment of climate risk in business operations and the result of an annually revised risk assessment. In the metric and target sections, this year's emission data for scope 3 fully meets the GHG protocol and covers all categories.



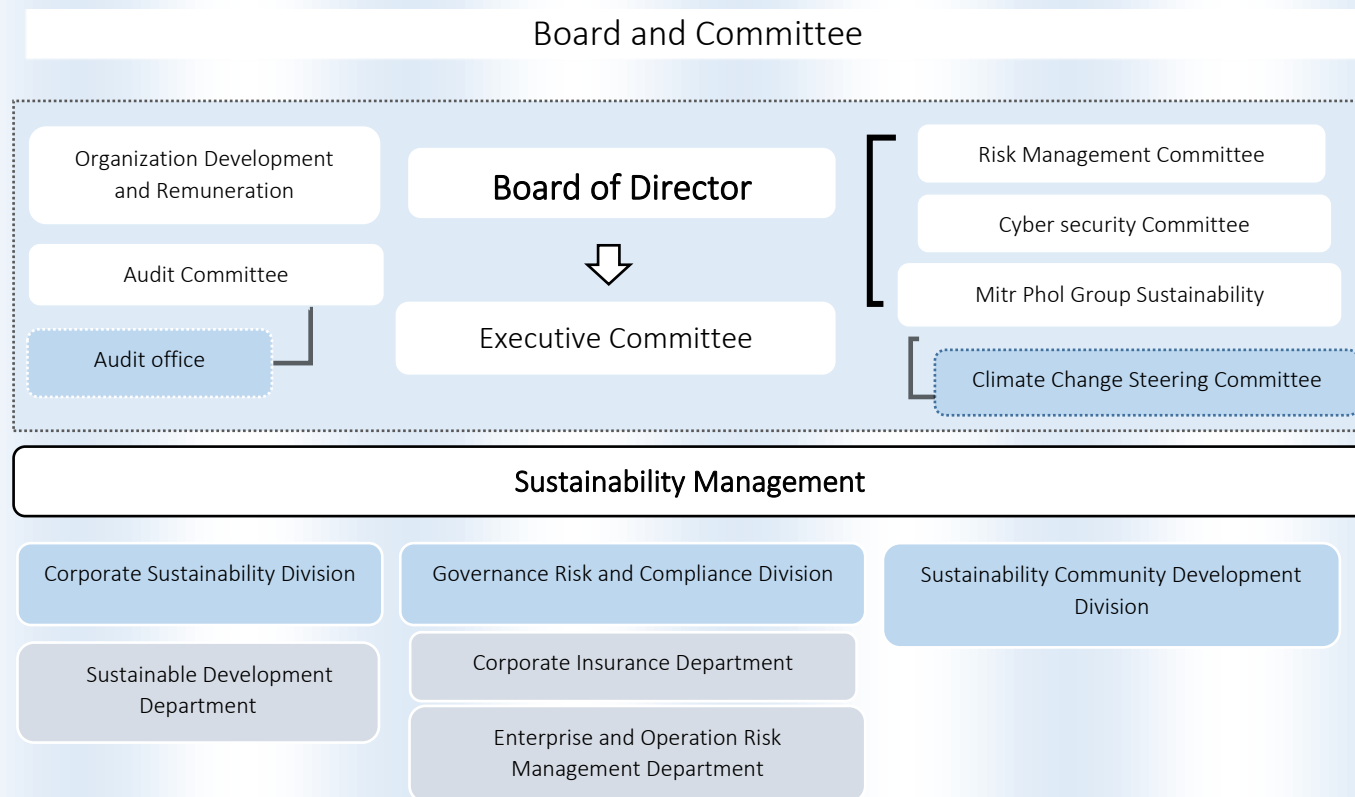
TCFD Framework



# 1. Governance

## 1.1 The Organization's Governance around Climate-Related Risks and Opportunities

Mitr Phol has established Group's sustainability committee, Risk management committee (RMC) and climate action steering committee to monitor and manage climate-related strategies by oversight of Mitr Phol Group's Board of Directors (BOD).



## 1.2 Role and Responsibility

Governing Body	Role and Responsibility	Meeting Frequency
Mitr Phol Group's Board of Directors (BOD)	BOD is ultimately collectively responsible for oversight of all strategic matters and supervision and control of all group's business unit. The BOD has four standing committees, each committee has its own responsibility; the organization development remuneration committee, the audit committee, the risk management committee and the sustainability committee.	At least once a year
Mitr Phol Group's sustainability committee	The sustainability committee is responsible for oversight duties in respect of the group's sustainability strategy and development. The responsibilities included sustainability policy, performance relating to ESG and the climate change issue, where the climate change impact and organization greenhouse gas emissions are important parts of materiality.	Quarterly
Risk management committee (RMC)	The RMC was established to assist the BOD in overseeing the company's management of enterprise-wide risk management and practice and environmental related issues as well as the implementation of policies and standards for monitoring and mitigating such risks and climate change. The RMC holds an annual meeting to review business key risks, of which climate risk is included, and a quarterly meeting to consider and report on issues related to risk management.	Quarterly
The climate action steering committee	This steering committee was established in 2022. The responsibility is to provide consultation, guidance, and overarching on the climate change strategy and risk issues related to climate change to Mitr Phol Group's sustainability committee, including the climate change strategy and climate change related risk.	Quarterly
Managing Director - Health Products and Sustainability Group	Managing Director is responsibility for implement of climate change strategy and risk management.	Quarterly
Executive Vice President - Corporate Sustainability Management	Task with overseeing and ensuring the implement of assessment, measurement of climate change risk at the business unit and site operational level.	Monthly

### 1.3 Management’s Role in Assessing and Managing Climate-Related Risks and Opportunities

To oversee enterprise risk and climate change, the BOD delegated decision-making on operational matters to executive committees in order to drive strategy, implementation, and execution at operational level. This operation level, sustainability management was established into 3 divisions to manage day-to-day work, such as sustainable development, governance risk and compliance, and sustainable community development. Concerning climate-related risks and issues, two major departments, enterprise and operational risk management and sustainable development, share responsibility. These departments work together to identify climate change-related risks and opportunities. Furthermore, the results of risk and opportunity assessments are collected in ESG and reported to the executive committee on a quarterly basis, which will be a materiality for RMC in risk strategy planning.



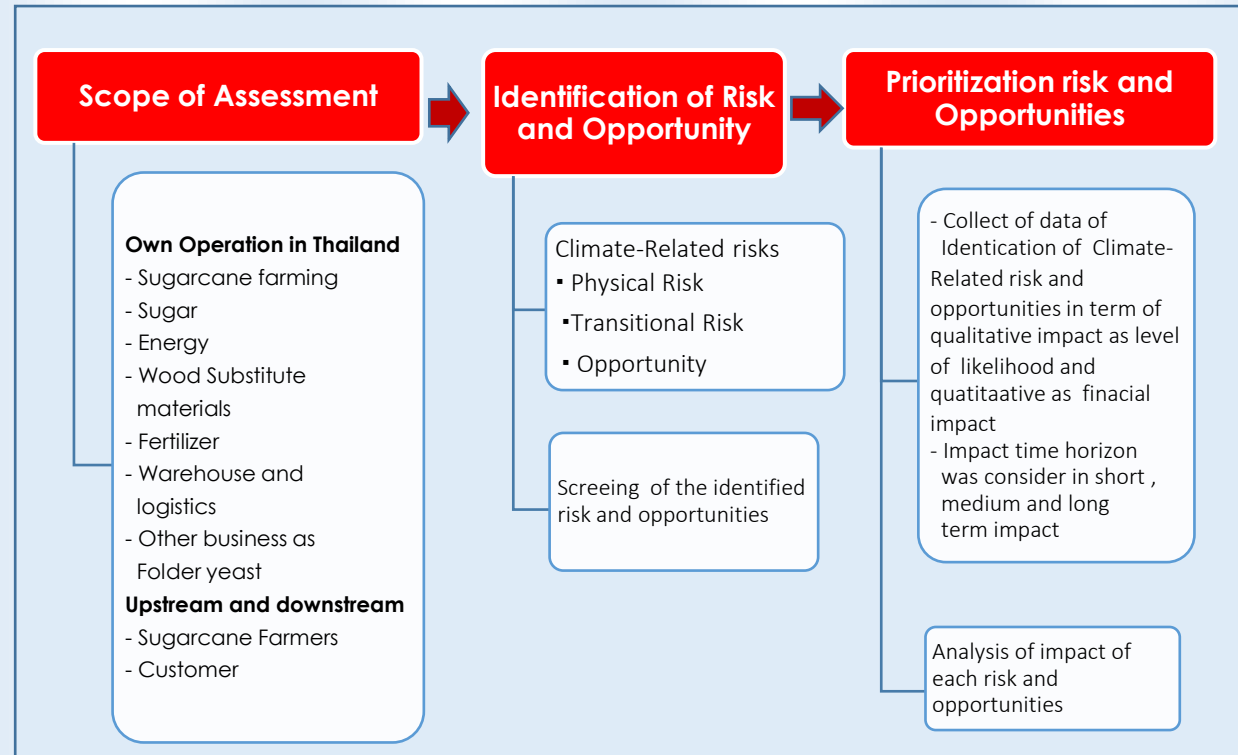




## 2. Strategy

### 2.1 The Climate-Related Risks and Opportunities

Mitr Phol Group has assessed the climate-related risks and opportunities associated with TCFD recommendations. We conducted assessments in order to identify, analyze, and evaluate major climate-related risks and opportunities. To this end, risk has been categorized into physical risk, transitional risk, and opportunities. They were accounting for different time horizons through different climate scenarios. The scope of assessment includes the major operations in Thailand, such as sugar cane farming, sugar business, energy business, wood substitute materials, fertilizer, warehouse and logistics, and other businesses such as folder yeast, etc..



*Climate – Related Risk and Opportunity Assessment*

## 2.2 Scope of Climate-Related Risk Assessment

### 2.2.1 Physical Risk

All assets in Thailand and all business units were covered in these physical impacts of climate change assessment. Physical risk (drought, storm, flood, and temperature) is evaluated using four physical indicators based on **qualitative and quantitative** analysis through two climate scenarios (**RCP 2.6, well below 2°C, and RCP 8.5, above 4°C**). The assessment was conducted based on **short-term (2030), medium-term (2040), and long-term (2050) factors** by considering the asset's expected lifetime and activities.

#### *Factor of Physical Risk Assessment*

Physical Risk	Scenario	Time Horizon	Level of Evaluation
<ul style="list-style-type: none"> <li>▪ Drought</li> <li>▪ Flood</li> <li>▪ Storm</li> <li>▪ Temperature Increasing</li> </ul>	<p><b>RCP 2.6:</b> Global temperature well below 2°C</p> <p><b>RCP 8.5 :</b> Global temperature rising above 4°C</p>	<ul style="list-style-type: none"> <li>▪ Short term - 2030</li> <li>▪ Medium term 2030-40</li> <li>▪ Long Term 2040-50</li> </ul>	<ul style="list-style-type: none"> <li>▪ Level               <ul style="list-style-type: none"> <li>▪ Low –Medium-High</li> </ul> </li> <li>▪ Evaluation               <ul style="list-style-type: none"> <li>▪ Ratio of Damage</li> <li>▪ Expect cost of damage</li> <li>▪ Failure probability on operation</li> <li>▪ Impact on Business</li> <li>▪ Upstream-Own Business-Downstream</li> </ul> </li> </ul>

## 2.2.2 Transition Risk

Assessment of transition risk: climate risks occurred related to a low-carbon transition, which require legislation, policy, technology, and market change. To evaluate each risk, the condition is set based on **short- (2030), medium- (2040), and long-term (2050)** qualitative and quantitative climate-related and across 4 scenario analysis. The impacts are measured on both indirect and direct levels. In addition, the evaluation of transition risk will be analyzed using the World Energy Outlook (WEO) scenarios recommended by the IEA, including **STEPS: State Policy; AP: Announced Policies Scenario; SDS: Sustainable Development Scenario; and NZE: Net Zero Emissions by 2050 Scenario.**

### Factor of Transition Risk Assessment

Transitional Risk	Scenario	Time Horizon	Type of Evaluation
<ul style="list-style-type: none"> <li>▪ Market</li> <li>▪ Technology</li> <li>▪ Policy-Legal</li> <li>▪ Reputation</li> </ul>	<p><b>STEPS:</b> <i>State Policy Current</i> and previously policies announced by Thai governments (Implemented in 2015 after COP21)</p> <p><b>AP:</b> <i>Announced Policies Scenario</i> All climate commitments of Thai governments, (Nationally Determined Contributions (NDCs) and longer-term net zero targets etc..</p> <p><b>SDS:</b> <i>Sustainable Development Scenario</i> Allied with Paris Agreement but without any net negative emissions, this scenario is consistent with limiting the global temperature rise to 1.65 °C</p> <p><b>NZE:</b> <i>Net Zero Emissions 2050 Scenario</i> : Setting pathway for the global energy sector to achieve net zero emissions by 2050</p>	<ul style="list-style-type: none"> <li>▪ Short term - 2030</li> <li>▪ Medium term 2030-40</li> <li>▪ Long Term 2040-50</li> </ul>	<ul style="list-style-type: none"> <li>▪ Level <ul style="list-style-type: none"> <li>▪ Direct and Indirect Impact</li> </ul> </li> <li>▪ Evaluation <ul style="list-style-type: none"> <li>▪ Ratio of Damage</li> <li>▪ Expect cost of damage</li> <li>▪ Failure probability on operation</li> </ul> </li> </ul>

## 2.3 Analysis and Result

### 2.3.1 Physical Risk

<b>Risk</b>	<b>Impact</b>	<b>Scenario</b>	<b>Potential Impact Across Time Horizon</b>			<b>Description</b>	<b>Impact</b>
<b>DROUGHT</b>	Business	Scenario	2030	2040	2050	2030-2050:  ▪ RCP2.6 and 8.5, drought in all periods is slight and occur in all provinces where Mitr Phol sites, and through upstream and downstream are located.	<b>Value Chain</b>  <u>Upstream</u> ▪ Raw materials shortage ▪ Potential of infestation of pests such as longhorn beetle <u>Own operation</u> • Change in the product quality • Increase in operational cost <u>Downstream:</u> • Low level production to deliver may cause monetary damage
	Upstream	①	■	■	■		
	Own Operation	②	■	■	■		
<b>FLOOD</b>	Upstream	①	■	■	■	2030-2050:  • RCP 2.6: floods are significant increase in all provinces, especially in central provinces • RCP8.5 floods will significantly increase in western and southern provinces	<u>Upstream</u> ▪ Decreasing of raw materials due to reduction in sugarcane planting area ▪ Increase in sugarcane borer due to high humidity ▪ The transport of raw materials was interrupted <u>Company's Operation (Own operation)</u> ▪ Reduction in fermentation efficiency for the ethanol product ▪ Production interruption ▪ Damaged buildings ▪ Employee unable to travel to work ▪ Product damaged during transportation <u>Downstream</u> ▪ Late delivery causing customers to stop their production line
	Own Operation	②	■	■	■		
	Down Stream						

① RCP 2.5    ② RCP 8.5

Impact : Upstream   Own Operation   Downstream

■ LOW    ■ MEDIUM    ■ HIGH

<b>Risk</b>	<b>Impact</b>	<b>Scenario</b>	<b>Potential Impact Across Time Horizon</b>			<b>Description</b>	<b>Impact</b>
<i>STROM</i>	Business	Scenario	2030	2040	2050	2030-2050: <ul style="list-style-type: none"> <li>RCP2.6: Intensity of storms will slightly increase</li> <li>RCP8.5: Intensity of storms will moderately increase</li> </ul>	<i>Value Chain</i>
	Upstream Own Operation Down Stream	① ②	■ ■	■ ■	■ ■		<u>Upstream</u> <ul style="list-style-type: none"> <li>Decrease in raw material due to plant uprooting which result from extreme wind speed</li> <li>Increase accident cases of farmer due to lighting</li> <li>Increase in possibility of wildfires due to lighting and wind speed</li> </ul> <u>Own operation</u> <ul style="list-style-type: none"> <li>Increase the power outage due to damaged transmission line</li> <li>Production interruption</li> <li>Damage solar panels and buildings</li> </ul> <u>Downstream</u> <ul style="list-style-type: none"> <li>Insufficient products for customers and monetary damage</li> </ul>
<i>Increasing Temperature</i>	Upstream Own Operation Down Stream	①	■	■	■	2030-2050: <ul style="list-style-type: none"> <li>RCP2.6: The mean temperature of most provinces will increase.</li> <li>RCP8.5: Mean temperature of all provinces slightly increases in 2030 and moderately increases in 2040-2050.</li> </ul>	<u>Upstream</u> <ul style="list-style-type: none"> <li>Raw material shortage due to an increase in soil salinity and disease, insects and weeds</li> <li>Quality control problems of raw materials due to a faster deterioration rate</li> <li>Increase in possibility of wildfire</li> </ul> <u>Own operation</u> <ul style="list-style-type: none"> <li>Decreased quality of product Shortened equipment life (Electronic equipment, motor)</li> <li>Higher evaporation of the raw water</li> <li>Higher evaporation of ethanol in storage tank</li> </ul> <u>Downstream</u> <ul style="list-style-type: none"> <li>Insufficient products and monetary damage</li> </ul>
		②	■	■	■		

① RCP 2.5    ② RCP 8.5

Impact : Upstream   Own Operation   Downstream

■ LOW    ■ MEDIUM    ■ HIGH

### 2.3.2 Transitional Risk

<b>Transitional Risk</b>		<b>Potential Impact Across Time Horizon</b>			<b>Impact</b>
	Description	2030	2040	2050	Value Chain
<i>Market</i>	This is a potential impact on the loss of revenue or market share due to changing customer behavior or stakeholder expectation on the sustainability standard and ESG practice.	■	■	■	<u>Upstream</u> <ul style="list-style-type: none"> <li>Farmers and suppliers receive more pressure to change farm management to be the same line with Bonsucro certification or other regenerative farm system</li> </ul> <u>Own operation</u> <ul style="list-style-type: none"> <li>Higher investment costs for production and research on low-carbon products</li> <li>Higher costs of quality control and raw materials</li> <li>Reduce ethanol sale due to the change behavior of customer in fossil fuel</li> <li>higher cost on bio-jet fuel technology and no market feasible till 2030 afterward, there are many uncertain factors affecting investment, such as type of technology, feedstock, and domestic policy and regulation support.</li> </ul> <u>Downstream</u> <ul style="list-style-type: none"> <li>Customer-changing behavior from fossil car to EV will affect demand in ethanol</li> <li>Increase in customer request for Carbon Label and Bonsucro Certification</li> </ul>
<i>Technology</i>	Technology improvements that support the transition to low-carbon products such as SAF, and the disruption caused by the displacement of old systems by new technology or other higher efficiency	■	■	■	<u>Upstream</u> <ul style="list-style-type: none"> <li>Increase in raw material cost such as biomass fuel due to the more demand in clean energy</li> </ul> <u>Own operation</u> <ul style="list-style-type: none"> <li>Technologies that rely on unclean energy may not be able to part of operate due to obsolescence or lack of fuel</li> <li>Higher cost of developing technology due to the investment in new technologies of low emission</li> <li>Higher cost due to fuel shift from high emission fossil fuel to biomass</li> </ul> <u>Downstream</u> <ul style="list-style-type: none"> <li>Increase in expectation of the customer and business partner for the adaptation of clean technology which may result in higher prices of the product</li> </ul>

Scenario : STEPS AP SDS NZ

Impact : Upstream Own Operation Downstream

■ LOW ■ MEDIUM ■ HIGH

<b>Transitional Risk</b>		<b>Potential Impact Across Time Horizon</b>			<b>Impact</b>
	Description	2030	2040	2050	Value Chain
<b>Policy &amp; Legal</b>	<p>Policy actions that attempt to constrain actions that contribute to the adverse effects of climate change focused on the current regulation, emerging regulation and legal risk, carbon tax and the Draft of Thailand Climate Change Act.</p> <p>Policy actions that seek to promote adaptation to climate change as per Thailand's commitment on COP 26 to reducing its greenhouse gas emissions.</p>	■	■	■	<p><u>Upstream</u></p> <ul style="list-style-type: none"> <li>Higher raw material costs due to strict regulations</li> </ul> <p><u>Own operation</u></p> <ul style="list-style-type: none"> <li>Decrease demand of ethanol due to the Thailand EV roadmap 2030, which target increasing electricity vehicle by using tax incentives for both the carmakers and buyers.</li> <li>Thailand's energy policies and regulations may enforce a charge on such fossil fuel emissions, so it will have an indirect impact on business energy costs.</li> <li>Increase the cost of improving the organization to be in accordance with the law such as GHG emission tax</li> <li>Increase in EU strictness on importing timber products, according to The EU Green Deal and the implementation of the BIO-Diversity and Deforestation law.</li> <li>Higher cost due to the modification of the transport fleet or being fined for fossil fuel</li> </ul> <p><u>Downstream</u></p> <ul style="list-style-type: none"> <li>Obstacle to expanding the business due to a violation of the law.</li> </ul>
<b>Reputation</b>	Changing customer or community perceptions of an organization's contribution to or detraction from the transition to a lower-carbon economy	■	■	■	<p><u>Upstream</u></p> <ul style="list-style-type: none"> <li>Farmers shift cultivation from sugar cane to other agricultural products that are more profitable due to the impact of climate change</li> </ul> <p><u>Own operation</u></p> <ul style="list-style-type: none"> <li>Reputation and recognition from customer's conscious on product and organization</li> <li>Reputation on brand value may affect a decrease in revenue</li> </ul> <p><u>Downstream</u></p> <ul style="list-style-type: none"> <li>Higher complexity in trading with partners, such as the GHG reduction assessment in purchase conditions</li> <li>Obstacle to expanding the business due to the lack of confidence of stakeholders in the environmental protection of the organization.</li> </ul>

Scenario : STEPS AP SDS NZ

Impact : Upstream Own Operation Downstream

■ LOW ■ MEDIUM ■ HIGH

### 2.3.3 Opportunity

<b>Opportunity</b>		<b>Potential Impact Across Time Horizon</b>			<b>Impact</b>
	Description	2030	2040	2050	Value Chain
<i>Renewable Energy</i>	Future demand for renewable energy will rise because of the net zero policy and increased awareness of GHG emissions from energy usage from fossil sources, which will benefit Mitr Phol's bioenergy business (biomass power plants and biofuel). As a result, the trend for cost savings and revenue from renewable energy is upward.	■	■	■	<u>Upstream</u> <ul style="list-style-type: none"> <li>Increase in saving costs for farmer due to renewable energy such as solar</li> </ul> <u>Own operation</u> <ul style="list-style-type: none"> <li>Increased revenue from the demand of clean energy such as bio-mass power plants</li> <li>Cost reduction on renewable energy technology</li> </ul> <u>Downstream</u> <ul style="list-style-type: none"> <li>Increase in capability to encourage customers to achieve carbon targets in 2050 by reducing GHG emissions in scope 1 and 2.</li> </ul>
<i>Low Carbon Product</i>	According to the increased demand for low-carbon products due to changing customer behavior, Mitr Phol has the potential to increase sustainable and low-carbon market production. Product diversification can encourage the resilience of Mitr Phol's business in the future.	■	■	■	<u>Upstream</u> <ul style="list-style-type: none"> <li>Increase in quantity and quality of low-carbon raw materials</li> </ul> <u>Own operation</u> <ul style="list-style-type: none"> <li>Increases in income from environmentally friendly products have an upward trend.</li> </ul> <u>Downstream</u> <ul style="list-style-type: none"> <li>Increase in capability to encourage customers to achieve carbon targets in 2050 by reducing GHG emission scope 3.</li> </ul>
<i>Carbon Credit Market</i>	According to COP26 and global trends, several companies have committed to achieving net zero by 2050. But the during transition period of 2020-2030, carbon neutrality will be an option for those companies to set a goal to be carbon neutral by 2030 or use 100% renewable energy. So the carbon credits and RECs (renewable energy certificates) on the market will not be sufficient for offsets. This can result increase in carbon credit and REC prices from 2020 to 2023.	■	■	■	<u>Upstream</u> <ul style="list-style-type: none"> <li>New income from the carbon removal for the farmer and sustainable supplier from selling carbon credit</li> </ul> <u>Own operation</u> <ul style="list-style-type: none"> <li>Generate profit from selling RECs and carbon credit</li> <li>Create a new market for trading.</li> <li>Create a brand image and an opportunity to compete in the market with low- carbon products</li> </ul> <u>Downstream</u> <ul style="list-style-type: none"> <li>Increase in capability to encourage customers to achieve carbon</li> </ul>

Scenario : STEPS AP SDS NZ




Impact : Upstream Own Operation Downstream

■ LOW ■ MEDIUM ■ HIGH



## 2.4 Financial Impact

To measure climate risk, the financial impact of climate-related risks was analyzed through each of the three risk issues identified: physical risk, transition risk, and opportunity. However, some risks cannot translate into financial figures because of the difficulty of getting data and information from some stakeholders or the inability to estimate an investment in such a technology as CCS or CCUS. So, these risks were identified in terms of their magnitude of financial impact instead.

Physical Risk 	Time Frame					Impact	Transitional Risk 	Time Frame					Impact	Opportunity 	Time Frame				Impact
	S T	M T	L T	Own	VC			S T	M T	L T	Own	VC			S T	M T	L T	Own	
Drought	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Market		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Renewable Energy		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Strom			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Technology			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Low carbon product			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Flood		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Carbon Tax	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Carbon Market	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Temperature Increasing		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Reputation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

High Financial Impact > 12% of EBT	Medium Financial Impact 4-11% of EBT	Low Financial Impact < 4% of EBT	ST: Short term MT: Medium Term LT: Long Term	Own Operation: Own Value Chain : VC
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To translate risk impact into financial terms, the link between the magnitude of climate risk, which causes loss and advantages on revenue, must be quantified into a financial figure over the entire time frame and climate scenarios. The magnitude of financial impacts is categorized into three levels: (1) high financial impact affects EBT more than 12%; (2) medium financial impact affects EBT 4–11%; and (3) low financial impact affects EBT less than 4%. The risks that impact financial risk will be described in Sections 2.4.1–2.4.3.

### 2.4.1 Physical Risk

All physical risks create a slight impact based on Mitr Phol's financial impact criteria; that impact is defined as a slight risk if it creates a financial impact less than 4% of EBT. The only risk that is classified as having an extreme risk level is drought. This risk has an impact on the financial performance of more than 12% of EBT over the entire timeframe and both RCP 2.6 and RCP 8.5 scenarios.

Percentage of financial impact when compare with EBT (%)	Year		
	2030 (Short term)	2040 (Medium Term)	2050 (Long Term)
RCP2.6 (temp rising below 2°C)	19.20%	17.89%	16.58%
RCP8.5 (temp rising below 4°C)	18.18%	16.51%	14.71%

## 2.4.2 Transition Risk

Among those four transitional risks, the assessment results indicate that the regulation "carbon tax" has the highest consideration, as it will have a financial impact. The assessment aspects have been done regarding direct and indirect impact:

DIRECT IMPACT	INDIRECT IMPACT
A financial impact is an analysis of carbon tax policy by applied Singapore's carbon tax structure as a reference policy, because Thailand has no policy on carbon taxes currently.	Analysis based on the increasing price of purchased electricity, which is due to strict policy and regulation. The China's carbon price scenario is applied according to the IEA forecast report for 2021.

Percentage of total financial impact when compare with EBT (%)	Year –Direct			Year -Indirect		
	2030 (Short term)	2040 (Medium Term)	2050 (Long Term)	2030 (Short term)	2040 (Medium Term)	2050 (Long Term)
Stated Policies Scenario [STEP]	0.13	1.06	5.93	0.15	0.22	0.27
Announced Policies Scenario [AP]	0.11	0.78	0.93	0.15	0.46	0.78
Sustainable Development Scenario [SDS]	0.10	0.67	0.72	0.20	0.54	0.78
Net Zero Emission by 2050 Scenario [NZE]	0.09	0.50	0.26	0.44	0.78	0.98

Percentage of total financial impact when compare with EBT (%)	Year		
	2030	2040	2050
Stated Policies Scenario [STEP]	0.28	1.28	6.91
Announced Policies Scenario [AP]	0.26	1.24	1.94
Sustainable Development Scenario [SDS]	0.30	1.20	1.50
Net Zero Emission by 2050 Scenario [NZE]	0.53	1.28	1.24

### 2.4.3 Opportunity

Renewable energy is considered the highest prospect compared to other low-carbon products because we have raw materials collected from our own sugar mills. Furthermore, most climate ambitions target renewable energy, so the increased demand for renewable energy will have a direct impact on the price of renewable electricity. The higher ambition will have an impact on both demand and the price of renewable electricity. In the NZE scenario, the increase in the price of renewable electricity will be 3.61% compared with EBT in 2050, while the impact in the STEP scenario will be 0.99% compared with EBT. Therefore, the higher level of ambition on the climate change issue results in a positive impact on renewable electricity generation for Mitr Phol's businesses.

*Positive Impact of Increase in renewable electricity price with EBT (%)*

Percentage of total financial impact when compare with EBT (%)	Year		
	2030 (Short term)	2040 (Medium Term)	2050 (Long Term)
Stated Policies Scenario [STEP]	0.54	0.81	0.99
Announced Policies Scenario [AP]	0.54	1.71	2.88
Sustainable Development Scenario [SDS]	0.72	1.98	2.88
Net Zero Emission by 2050 Scenario [NZE]	1.62	2.88	3.61

All scenarios indicated a positive impact on renewable electricity in terms of increased revenue. The most creates financial value is the Net Zero Emission by 2050 (NZE), but the least impact on financial gain is the state policies (STEP). In the illustrated table above, the financial impact on EBT of NZE in all timeframes is 3.61% in the long term, 2.88% in the middle term, and 1.62% in the short term. The financial impact on EBT of the STEP in all timeframes is 297 million baht in the short term, 1445 million baht in the middle term, and 543 million baht in the long term, or 0.54% in the short term, 0.81% in the middle term, and 0.99% in the long term, according to impact with EBT (%).

## 2.5 Summary of Risks Adaptation and Mitigation

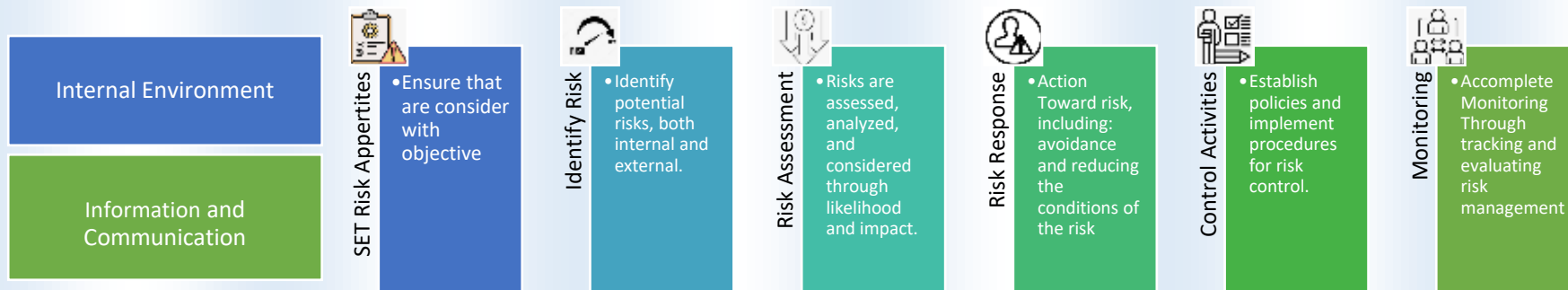
<p><i>Physical Risk</i></p>	<p><b>Drought</b></p> <p><b>Drought</b> is prioritized as a key impact on Mitr Phol Group’s business as most of its plantations are located in areas of high water stress. Although the mean drought index of Thailand reported a slight decrease due to lower annual precipitation, <u>drought</u> has been defined as the highest risk rating for Mitr Phol operations in the short, medium, and long terms. The historical data recorded shows that the long period of water scarcity can lead to a decrease in sugarcane production, which might impact the shortage of raw materials through the value chain and result in a decrease in quantity and quality of the product. authorities, promoting the 4 R's project to reduce intake water, and upgrading wastewater treatment reuse and recycling (e.g. reverse osmosis systems)</p> <p><b>Mitigation and resilience</b></p> <ol style="list-style-type: none"> <li>1. the Oasis project, collaboration with government authorities for water reservoirs, and installation of solar pumps in agricultural areas</li> <li>2. promoting the 4 R's project to reduce intake water and upgrading wastewater treatment, reuse, and recycling together with other water efficiency</li> <li>3. Annual water risk measurement using AQUEDUCT</li> </ol>
<p><i>Transitional Risk</i></p>	<p><b>Carbon Tax</b></p> <p>Policy on climate change as Carbon tax has the highest impact on financial and profitability over all time frames and across all scenarios. The carbon tax law in Thailand is drafted and paid based on its emissions; these transition policies are supposed to be introduced in Thailand in the next few years due to the commitment of the Thai government to COP26.</p> <p><b>Mitigation and Resilience</b></p> <ol style="list-style-type: none"> <li>1. Applied Internal carbon pricing to be an internal carbon charge of carbon emission, these mechanism can put a value on their greenhouse gas emissions in a way that drives positive change in GHG reduction and energy efficiency</li> <li>2. Setting an ambition target to reduce CO2 and achieve net zero</li> </ol>
<p><i>Opportunity</i></p>	<ol style="list-style-type: none"> <li>1. Renewable Energy is an opportunity to Mitr Phol to improve both existing infrastructure and new projects to be <b>flexible and resilience against physical risks</b>. The existing of operation include strengthening infrastructure and machine to endure physical risk impacts, improve water circularity/install internal water supply production and pick-up locations for new operation in the low-risk areas (e.g. high elevation).</li> <li>2. The <b>increase in demand of renewable energy</b> can provide Mitr Phol with growth of revenue from renewable energy (such as biomass power plant and bio-ethanol). Moreover, the electricity generation by biomass can reduce the implementation cost of renewable energy project to improve the efficiency of production (e.g. hydrogen fuel).</li> <li>3. Mitr phol has the potential for <b>product diversification by developing several low carbon product</b> such as chemical product (e.g. carboxylate product), bio-packaging and biopolymer. Also, value-added approach can be adapt by upgrading the ethanol product to bio-fuel jet and SAF. In addition, the improvement of production efficiency and portion of renewable energy can lead to lower GHG emission in production line (low carbon sugar).</li> <li>4. Increase in customers demand on <b>carbon offsets and determination to achieve the climate target</b> can provide Mitr Phol with chance to adapt business model by presenting <b>new solutions</b> to help customers to achieve their climate target. This includes selling solar energy project (PPA), and <b>Renewable Energy Certificates (RECs) and carbon credit</b>.</li> </ol>

# 3. Risk Management

## 3.1 Overview

The Mitr Phol Group’s risk management system and policy have been approved by the risk management committee (RMC). Since 2012, the enterprise and operational risk management department has been established to function on a day-to-day risk management basis in all business units. This department conducted business risk assessments, managed risk, promoted safety, and complied with law and regulation. The risk policy and assessment are reviewed by the risk department and RMC once a year. Generally, enterprise risk has been classified into the areas of strategic, operational, financial, legal, and regulatory compliance risk. In addition, climate change is classified as part of operational risk, and the risk description is clearly stated and embedded in all business units. The risk system and management are carried out in accordance with the COSO Enterprise Risk Management, which is integrated into the ESG-related risk management. The process of risk identification is done on an ongoing basis, such as for workshop and engineering requirements. The measurement of each risk is subject to each business unit, which depends on both the perspective of likelihood and potential impact in line with the COSO framework.

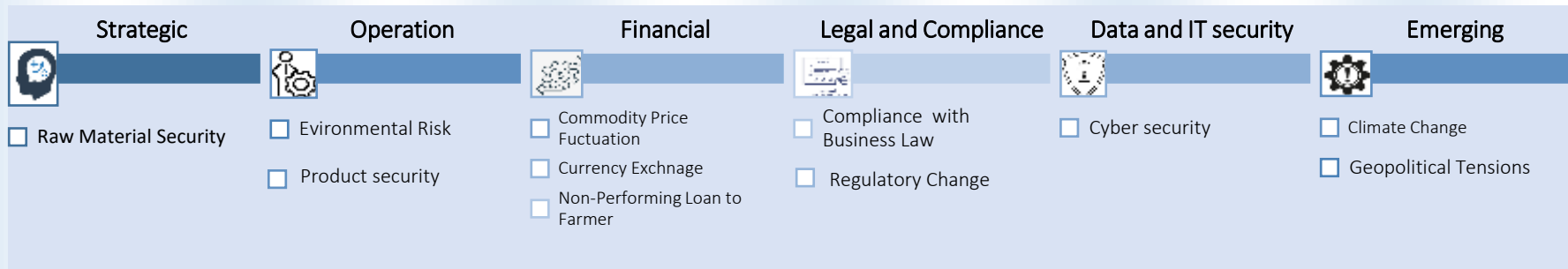
### Risk Management Framework



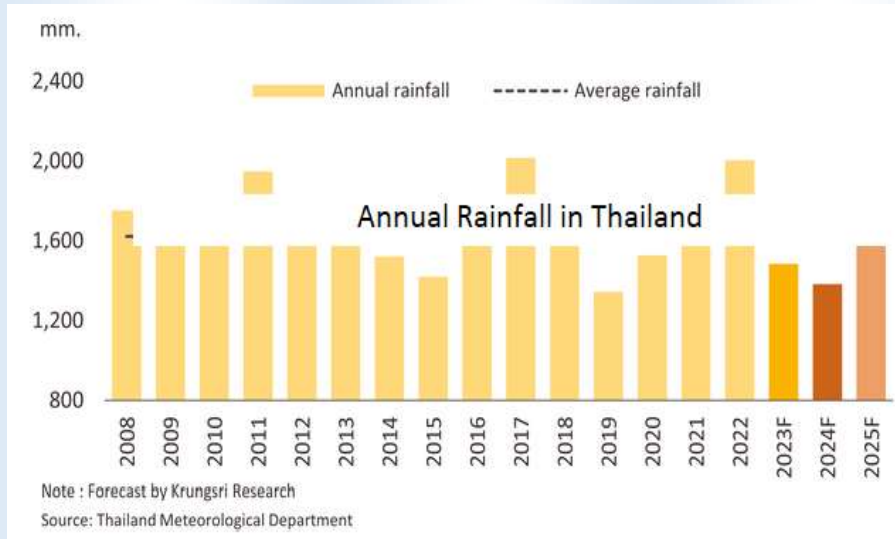
### 3.2 An Embedding of Climate Change into Risk Management

Since TCFD was initiated in 2022, it was carried out by RMC to support the addressing of climate risk as an enterprise risk, which was classified as part of operational risk. But in 2023, climate change is raised as an emerging risk and embedded in all business units. Because our value chain is agricultural-based, when considering both physical and transitional risks, the physical risk from extreme weather is prioritized rather than the transitional risk for a short time frame. For the upstream value chain, such as the farm business and sugar cane framer, the operation control, we used an aqueduct water risk to determine the risk of each site. If the site is located in a water-stress area or facing impacts from El Nino and La Nina, mitigation for both floods and droughts shall be in action to reduce the impact of those risks.

#### Risk List



### 3.2.1 Updated Risk Issue on the Climate Change: Extreme Drought from El Nino Emerge in 2023-2024



According to the El Nino situation, all the value chain was affected by a shortage of water supply, as sugar cane is a crucial raw material from upstream to downstream, as the rainfall will dip below average (-5%) – (-10%). This impact s our supply chain as follows:

1. Upstream: Farmer increasing in expenditure for fertilizer, pesticides and energy
2. Own Operation: Sugar Lack of raw materials, decline in sugar production
3. Downstream: Ethanol and Electricity facing the Lack of raw materials. Mitigation
  1. Provide reservoir for the sugar cane plantation area
  2. Water efficiency
  3. Temporary utilization of underground water and use solar PV for water pump stations



## 4. Metric and Targets

### 4. Metric and Targets

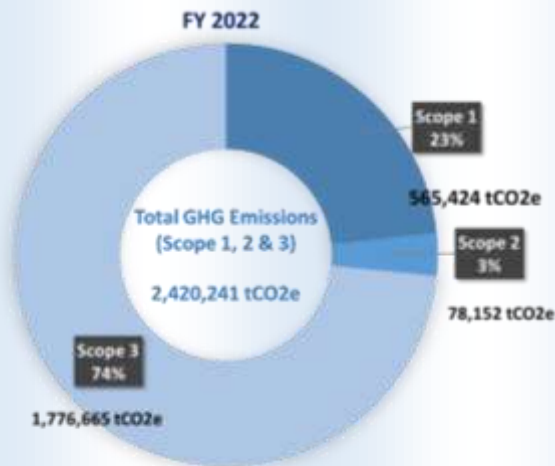
Mitr Phol has set environmental goals for our operations and working toward our ambition to strive for climate change impact in operations. Climate-related risk in our own operational performance has been disclosure in sustainability report since 2013 and also the GHG emissions. For the GHG emission report since 2013 data generally vary due to energy consumption. In the measurement of GHG emissions, the collection and calculation have been developed, so the data accuracy has been steady and ongoing from year to year. At the beginning of disclosing emission data, we covered mainly the emissions in scope 1 and scope 2. For scope 3, we began calculation in categories 4, 6, and 9 (emissions from upstream transportation and distribution, business travel, and downstream transportation and distribution) in the year 2021 and aim to cover the collection and calculation of all 15 categories in this year.

#### 4.1 Mitr Phol GHG emission

The scope of GHG emissions data for Mitr Phol Group covers the data of Mitr Phol's operation in Thailand, including farming business, sugar business, energy business, wood substitute materials business, fertilizer business, logistics and warehouse business and other businesses. The emissions are calculated based on the guidance from the GHG Protocol. The emission factors refer to the data of Thailand Greenhouse Gas Management Organization (Public Organization), IPCC 2006, and Thai National LCI database. The GWP data refer to IPCC, AR5. To evaluate the accuracy and reliability of the data and methodology, we conducted the limited assurance for the GHG emissions Scope 1 and Scope 2 during 2019-2021 by the third party. In 2022, we extended the assurance scope to cover GHG emissions scope 1, scope 2 and scope 3. The GHG emissions data during 2019 – 2022 are shown as below.



## Mitr Phol GHG emission



Data	Unit	2019*	2020*	2021*	2022**
<b>Direct GHG emissions (Scope 1)</b>	<b>tCO<sub>2</sub>e</b>	<b>343,646</b>	<b>342,482</b>	<b>382,318</b>	<b>565,424</b>
Biogenic CO <sub>2</sub> emissions	tCO <sub>2</sub>	6,766,178	5,597,886	11,376,682	8,168,456
<b>Energy indirect GHG emissions (Scope 2)</b>	<b>tCO<sub>2</sub>e</b>	<b>105,492</b>	<b>78,322</b>	<b>77,988</b>	<b>78,152</b>
<b>Other indirect GHG emissions (Scope 3)</b>	<b>tCO<sub>2</sub>e</b>	<b>163,646<sup>A</sup></b>	<b>105,227<sup>A</sup></b>	<b>1,193,123</b>	<b>1,776,665</b>
1. Purchased goods and services	tCO <sub>2</sub> e	-	-	807,493	993,266
2. Capital goods	tCO <sub>2</sub> e	-	-	-	-
3. Fuel and energy related activities (not included in Scope 1 and 2)	tCO <sub>2</sub> e	-	-	24,959	87,420
4. Upstream transportation and distribution	tCO <sub>2</sub> e	37,492	35,143	106,497	149,403
5. Waste generated in operations	tCO <sub>2</sub> e	-	-	1,503	1,018
6. Business travel	tCO <sub>2</sub> e	36,451	44,607	97	238,495
7. Employee commuting	tCO <sub>2</sub> e	-	-	13,830	9,358
8. Upstream leased assets	tCO <sub>2</sub> e	NR	NR	NR	NR
9. Downstream transportation and distribution	tCO <sub>2</sub> e	89,703	25,477	103,527	185,233
10. Processing of sold products	tCO <sub>2</sub> e	-	-	-	-
11. Use of sold products	tCO <sub>2</sub> e	-	-	132,719	110,002
12. End of life treatment of sold products	tCO <sub>2</sub> e	-	-	2,320	2,187
13. Downstream leased assets	tCO <sub>2</sub> e	-	-	178	284
14. Franchises	tCO <sub>2</sub> e	NR	NR	NR	NR
15. Investments	tCO <sub>2</sub> e	NR	NR	NR	NR

Remark:

\* Refer to data collection during 1 November of the previous year to 31 October of the reporting year.

\*\* Refer to data collection during 1 January 2022 – 31 December 2022.

NR refer to Not Relevant.

<sup>A</sup> Other indirect GHG emissions (Scope 3) in 2019-2020 include GHG emissions from raw material transportation by third-party organization, product transportation by third-party organization, and employee's ground transportation and air travel. For 2021-2022, the GHG emissions scope 3 covers 15 categories according to GHG Protocol.

Breakdown by business unit see link : [https://www.mitrphol.com/pdf/Appendix Envi SR 2019 2022 EN.pdf](https://www.mitrphol.com/pdf/Appendix_Envi_SR_2019_2022_EN.pdf)

## 4.2 Climate Change-Related Target

We are committed to be carbon neutral by 2030 and Net Zero by 2050 in line with the Science Based Target Initiatives (SBTi), 1.5°C emissions scenarios.



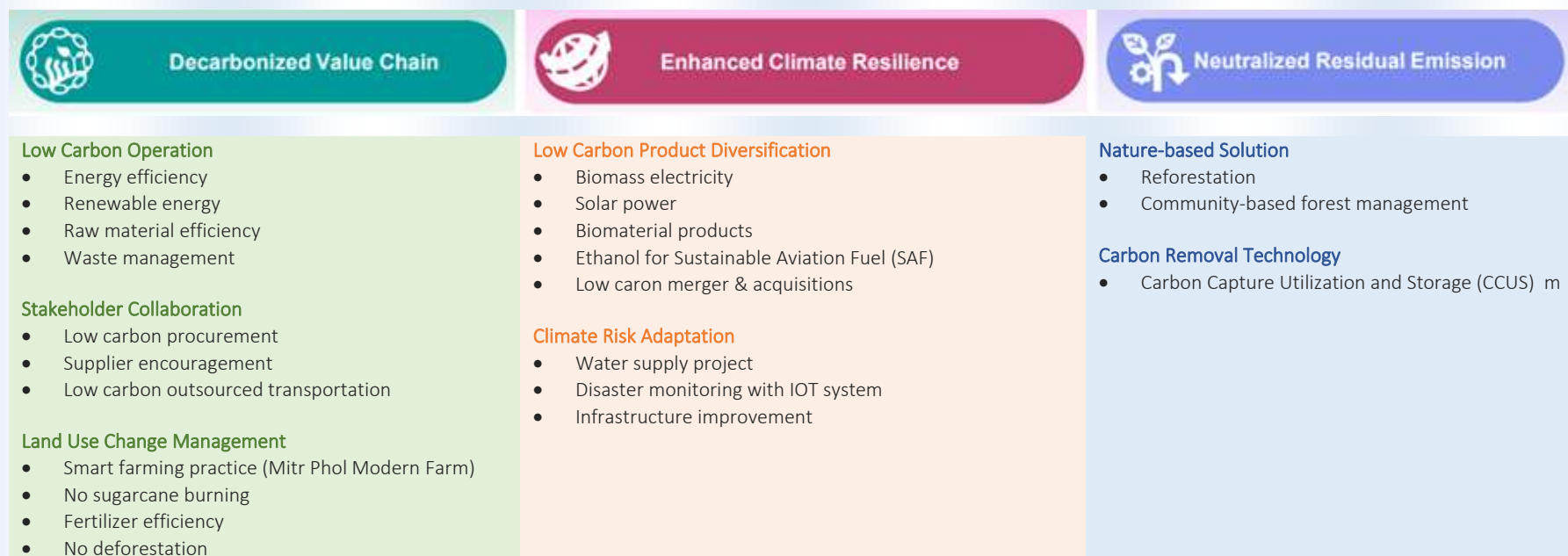
- In 2022, Mitr Phol has committed to reduce direct GHG emissions (Scope 1), energy indirect GHG emissions (Scope 2), and other indirect GHG emissions (Scope 3) by 5% per revenue, in comparison to the base year of 2021. Moreover, Mitr Phol has set the absolute reduction target by cutting the emissions in scopes 1 and 2 by 42% and Scope 3 by 25% from the base year 2021 within 2030.

The performances of GHG emissions reduction against the target are as follows:

Data	Unit	2021	2022	2022 Target	Status
Direct GHG emissions (Scope 1) per revenue	tCO <sub>2</sub> e / million baht	6.39	5.47	6.07	Achieved
Direct GHG emissions (Scope 1)	tCO <sub>2</sub>	382,318	565,424	363,202	Not achieved
Energy indirect GHG emissions (Scope 2) per revenue	tCO <sub>2</sub> e / million baht	1.30	0.76	1.24	Achieved
Energy indirect GHG emissions (Scope 2)	tCO <sub>2</sub> e	77,988	78,152	74,089	Not achieved
Other indirect GHG emissions (Scope 3) Per revenue	tCO <sub>2</sub> e / million baht	19.93	17.19	18.93	Achieved
Other indirect GHG emissions (Scope 3)	tCO <sub>2</sub> e	1,193,123	1,776,665	1,133,467	Not achieved

Due to the new acquisition in 2022, Mitr Phol has expanded the reporting scope 10 sites, which consist of energy businesses, wood substitute materials businesses, transportation business, and other businesses. Furthermore, the volume of raw materials, sugarcane, was higher than last year 46%. Consequently, the 2022 GHG emissions in Scope 1, Scope 2 and Scope 3 were higher than the emissions in 2021. Although we did not achieve the reduction on the absolute target, the target of GHG emissions reduction intensity for Scope 1, Scope 2 and Scope 3 were achieved. We continue to put in a hard effort to reduce emissions by undertaking energy conservation projects, improving manufacturing processes to increase energy efficiency, and encouraging the use of renewable energy (biomass electricity, solar power) to reduce greenhouse gas emissions. In addition, we have promoted our sugarcane farmers to apply Mitr Phol ModernFarm to increase volume of fresh sugarcane cutting, reduce tillage and reduce energy consumption to contribute to GHG emissions reduction. We have collaborated with our customers and strive to reduce GHG emissions by initiating the program in our farming business.

To achieve Net Zero by 2050, we have developed emissions reduction and removal pathway to cover three strategy pillars, which are Decarbonized Value Chain, Enhanced Climate Resilience and Neutralized Residual Emission.





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