TCFD Report 2023

AUGUST 2023

Thai Union Group

Contents

List of Tables

List of Figures

1. INTRODUCTION TO TCFD

TCFD, or the Task Force on Climate-Related Financial Disclosures, has developed recommendations for businesses to adequately assess and address climate-related impacts, as well as to disclose financial information to investors and other stakeholders so that all parties can understand and avoid potential negative financial impacts from climate change. TCFD disclosure aims to demonstrate how climate change considerations are integrated into businesses' internal processes, systems, and goals, and is structured around the following four pillars: governance, strategy, risk management, and metrics and targets.

2. PURPOSE OF THIS DOCUMENT

Thai Union Group (referred to as Thai Union) is a global seafood leader with a portfolio including ambient seafood, frozen seafood, pet care and other value-added products. The Company acknowledges that a global effort is needed to limit the global temperature increase to below 1.5°C from pre-industrial levels, as outlined in the Paris Agreement. Recognizing the potential global contribution that Thai Union could make in furthering these efforts, the Company has set out to incorporate climate-related issues into its business strategy and maximize opportunities that arise from the transition to a low-carbon economy, while increasing resilience against potential climate change impacts. The climate issues that impact the seafood sector are complex. Therefore, incorporating the potential impacts of climate change – both the positive and negative – on Thai Union's operations and supply chain are critical to the Group's sustainable growth and operational resilience.

Thai Union has long recognized the importance of climate action since we first introduced SeaChange®, our global sustainability strategy, in 2016. Under the 'Responsible Operations' pillar of the strategy, we set a target of reducing Scope 1 and 2 greenhouse gas emission intensity by 30 percent by 2020, compared to the 2016 base year. Further to this, Thai Union committed to taking urgent climate action and aligning its greenhouse gas emission reduction targets with 1.5°C and net-zero, which were approved by the Science Based Targets initiative (SBTi) in June 2023.

In July 2023, Thai Union announced SeaChange® 2030, an expansion of its sustainability strategy, to deliver solutions for both people and planet. SeaChange® 2030 has five future outcomes including 'Climate Action' addressing the climate crisis through interconnected commitments namely 'Path to Net Zero Emissions', 'Responsible Agriculture', and 'Ecosystem Restoration'.

To demonstrate our commitment to climate action to our stakeholders, we are embarking on our TCFD disclosure journey to share how Thai Union identifies, manages, and responds to the financial challenges and opportunities posed by climate change. Looking ahead, we will seek to continually improve our own climate risk and opportunity management in line with TCFD recommendations and global best practices.

3. GOVERNANCE

To ensure that climate-related risks are adequately addressed and opportunities are promptly pursued, Thai Union integrates the oversight of climate-related issues throughout our governance structure.

Board of Directors and Board-Level Committees

From the Board of Directors through to the Risk Management Committee (RMC), where the RMC chairman is the independent director, and the members are diversely composed of four independent directors and top executives comprising of the CEO & President, Group CFO, Group Director of Corporate Office, and Group Director of Sustainability. They possess the expertise and knowledge in the Company's business and risk management. In addition, all levels are informed and provided recommendations about sustainability and climate-related risks and opportunities, including company plans and targets to manage such risks.

This includes evaluating the adequacy and appropriateness of environmental and climate-related risk assessment results and mitigation. The outcomes are regularly reported to the Board. The Risk Management Committee convenes several times per year and reports quarterly to the Audit Committee and the Board of Directors. Our Group Director of Sustainability is also a member of the Risk Management Committee to ensure a direct link between climate/sustainability strategy and the Board of Directors. Through this process, the Board considers sustainability and climate-related risks and opportunities in strategic and financial planning.

Climate-related issues are also overseen by the Sustainable Development (SD) Committee. The SD Committee is chaired by the CEO and co-chaired by the Group Director of Sustainability, and brings together key senior executives to review progress towards sustainability commitments, consider and assess emerging issues, and make strategic decisions to drive Thai Union's climate change and corporate sustainability initiatives, with a view to maintaining Thai Union's sustainability leadership in the industry. This includes oversight of climate-related risks and opportunities, and the setting of Science-Based Targets. The SD Committee makes recommendations on climate strategy and action to the Global Leadership Team (GLT) as appropriate. The decisions are also communicated to relevant functions and business units for implementation. The SD Committee reports its work and outcomes to the Board and shareholders via Thai Union's One Report (Annual Report).

Management-Level Governance: Global Leadership Team (GLT)

The Global Leadership Team (GLT) is the Group's chief operating decision maker. The GLT makes decisions on Thai Union's climate strategy, allocates resources, and assesses performance, including on climate governance. The Group Director of Sustainability sits on the Global Leadership Team to provide insights and advice on climate strategy and action.

The Group Risk Management function reports directly to the CEO & President, who is a member of the GLT. Hence, Risk assessment and mitigation formulation for climate-related risks are engaged and driven with the GLT from the Group level to subsidiaries level.

The Group Risk Management function implements the risk management at a Group level while providing advice and guidance on the risk management framework and process to subsidiaries.

Operational Level Governance

The Sustainable Development; Safety, Health and Environment; Risk Management; Strategy; and Investor Relations functions contribute to the implementation of Thai Union's climate strategy.

The Sustainable Development (SD) function serves as the coordinating body within Thai Union for climate strategy implementation, overseeing the development and implementation of climate-related programs alongside other relevant functions and in collaboration with external stakeholders. The SD function also collects and consolidates climate-related primary data, in particular Scope 3 GHG emissions, from business units for performance tracking and reporting.

The Safety, Health and Environment (SHE) function contributes to managing physical risks related to natural hazards, and transition risks including climate regulations monitoring. The SHE function has appointed a steering committee and internal mechanisms across the Group to monitor Scope 1 and 2 GHG emissions and mitigation actions through energy efficiency measures, operational circularity, and technological adoption.

Simultaneously, the Group Risk Management function incorporates climate-related risks into corporate risk management processes including identification, likelihood, impact analysis, and potential mitigation measures, which is then reported to the Risk Management Committee and the President.

In addition, the Group Risk Management and Sustainability functions are engaged to be a part of advisory functions to assess the sustainability-related risks for pre & post investment projects, including M&A activities and CVC investment to ensure the risks are well mitigated at an early stage.

The Strategy function incorporates climate-related goals and targets into Thai Union's wider corporate strategy, including identifying and pursuing climate-related opportunities, and the Investor Relations function collaborates with the SD function to communicate climate-related information to regulatory bodies and the investment community.

Management of compensation for high-level executives and general employees is based on the results of the Company's operations by annual targets and measures, in accordance with the Company's long-term strategic plan called 'Enterprise Objectives'. The 'Enterprise Objectives' describe the Company's priorities and directions, which entail the execution of the 'Healthy Living, Healthy Oceans' strategy across the Group, and the commercialization of sustainability initiatives to drive growth. As the SeaChange® sustainability strategy is an important part of the overall 'Healthy Living, Healthy Oceans' strategy embedded in the 'Enterprise Objectives', executive and employee compensation is linked to the Company's performance in advancing SeaChange® sustainability goals, including climate-related commitments and targets. [please refer to Thai Union's One Report 2022 page 163-165]

4. STRATEGY & RISK MANAGEMENT

4.1 Risk Identification, Assessment, and Management

Thai Union's Risk Management Committee assists the Board in overseeing risk management implementation, including sustainability and climate-related risks. The committee reviews the corporate risks profile and mitigation strategies in response to the dynamically changing external and internal environments, including strategic risk, operational risk, legal and compliance risk, and financial risk. The committee also assesses emerging risks and mitigation planning. In 2020, climate change was identified as a key strategic risk factor, with an increasing amount of risk. In addition, the Group Risk Management and Sustainability functions are engaged to be a part of advisory function to assess the sustainability-related risk for pre & post investment projects, including M&A activities and CVC investment to ensure the risks are well mitigated at an early stage.

The Group Risk Management Department coordinates and implements the risk management processes at the Group level, while Risk Coordinators at a subsidiary level organize and implement risk management according to guidance from the Group level. According to Thai Union's Group Risk Management Framework, a top-down risk assessment workshop is conducted annually by the Global Leadership Team to evaluate corporate risks, entities' common risks, and global emerging risks. Material risks are assigned to Group risk owners who manage, monitor and report the risk status back to the Risk Management Committee and Board of Directors once a quarter. Subsidiaries also conduct a bottom-up risk assessment, and material risks are managed by subsidiary-level risk owners. However, if the risk is high or may have a Group-level impact, responsibility for management is generally determined by Group-level executives.

4.2 Methodology to assess the impacts of climate related risks

In accordance with the TCFD's recommendations, Thai Union Group engaged with a third-party expert to conduct a climate-related scenario analysis, both qualitatively and quantitatively, to understand climate-related risks and opportunities that may have a material financial impact on the organization by 2050. This analysis was conducted taking into consideration different climate-related scenarios in line with the Intergovernmental Panel on Climate Change (IPCC), the International Energy Agency (IEA) and the Organization for Economic Co-operation and Development (OECD), as outlined in **Table 1** below.

Table 1 : Climate-related scenarios

	Time horizons	Scenarios		
Transition risks	**Short-term: 2030** **Medium-term: 2040**	**High Carbon Price Scenario (IEA 2DS)[1]** This scenario represents the	**Moderate Carbon Price Scenario[2]** This scenario assumes that policies	**Low Carbon Price Scenario (IEA STEPS)**

[1] This scenario is based on research by OECD and IEA (2017).

[2] This scenario draws on research by OECD and IEA along with assessments of the sufficiency of country Nationally Determined Contributions by Climate Action Tracker by Ecofys, Climate Analytics and New Climate Team. Countries with Nationally Determined Contributions that are not aligned to the 2°C goal in the short term is assumed to increase their climate mitigation efforts in the medium and long term.

	Time horizons	Scenarios		
	Long-term: 2050	implementation of policies that are considered sufficient to reduce GHG emissions in line with the goal of limiting climate change to 2°C by 2100.	will be implemented to reduce greenhouse gas emissions and limit climate change to 2°C in the long term, but with action delayed in the short term.	This scenario represents the full implementation of country Nationally Determined Contributions under the Paris Agreement, which is likely to be insufficient to achieve the goals of the Paris Agreement.[3]
Physical risks	**Short-term: 2030** **Medium-term: 2050** **Long term: 2090**	**Moderate Emissions Scenario (RCP 4.5)** Strong mitigation actions to reduce emissions to half of current levels by 2080. This scenario is more likely than not to result in warming in excess of 2 degrees Celsius by 2100.	**High Emissions Scenario (RCP 8.5)** Continuation of business as usual with emissions at current rates. This scenario is expected to result in warming in excess of 4 degrees Celsius by 2100.	

4.3 Climate-related Scenario Analysis

Thai Union assessed risks related to the transition to a lower-carbon economy and risks related to the physical impacts of climate change. Transitioning to a lower-carbon economy may entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change.

The scope of our assessment covers the following risks:

- Transition Risk: Policy Risk (at which current regulations and emerging regulations are considered)
- Transition Risk: Market Risk
- Transition Risk: Reputation Risk
- Transition Risk: Technology Risk
- Physical Risk (at which acute and chronic physical are considered)

Identified climate-related risks, opportunities, and impacts on the organization are presented in this section.

4.3.1 Transition risks

Policy and Legal Compliance

The TCFD identifies increased pricing of GHG emissions and increased operating costs (e.g., higher compliance costs) as examples of climate-related policy risk. Countries in which we operate and market our products may deploy more stringent policies and regulations to meet the Paris Agreement and their

[3] This scenario is based on research by OECD and IEA (2017).

respective nationally determined contributions (NDCs). This may in turn have financial impacts in the form of increased operating costs, which can affect the income statement and/or reduced demand for certain products due to fines which can in turn affect the income statement.

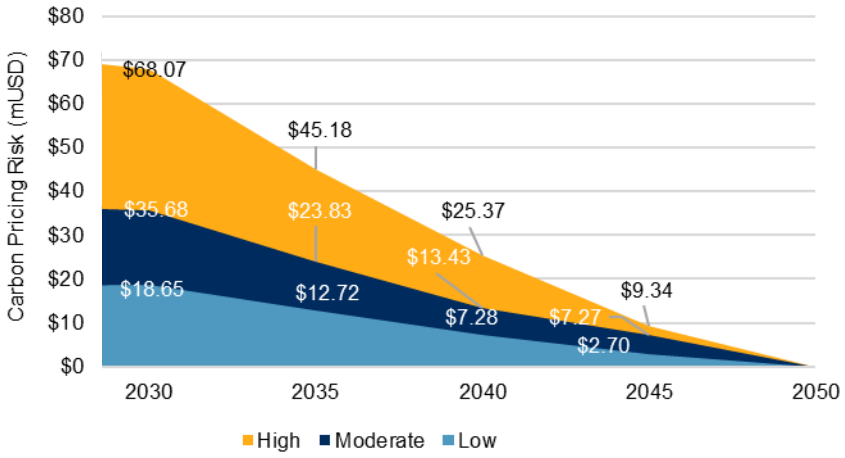
A carbon price is designed to quantify the negative impacts of climate change caused by GHG emissions. Carbon prices can take the form of carbon taxes and emission trading scheme (ETS). Carbon pricing policies in our key operational sites and markets would also lead to an increase of OPEX. The World Bank estimates just over 20 percent of global emissions are being covered by carbon taxes and ETS. The speed and level to which carbon prices may rise is uncertain and likely to vary across countries and regions.

Carbon pricing risk is represented by the impact of rising carbon prices on the Company's financial performance. It is dependent on both the total amount of GHG emissions from a location and potential carbon price increases at that location.

The analysis using carbon pricing risk projections indicates that:

- Thai Union's carbon pricing risk exposure for the year 2030 could range from USD 18.6 million (under the low carbon price scenario) to USD 68.1 million (under the high carbon price scenario) every year (see **Figure 1**).
- This trend is driven by a combination of increasing carbon prices but is offset by reducing greenhouse gas emissions, in line with Thai Union's targets[4].
- Thai Union's operations in East Asia and Pacific are exposed to the greatest carbon pricing risk, mainly due to the size of Thai Union's carbon footprint in this region, and the increase expected in carbon prices under the various scenarios used.

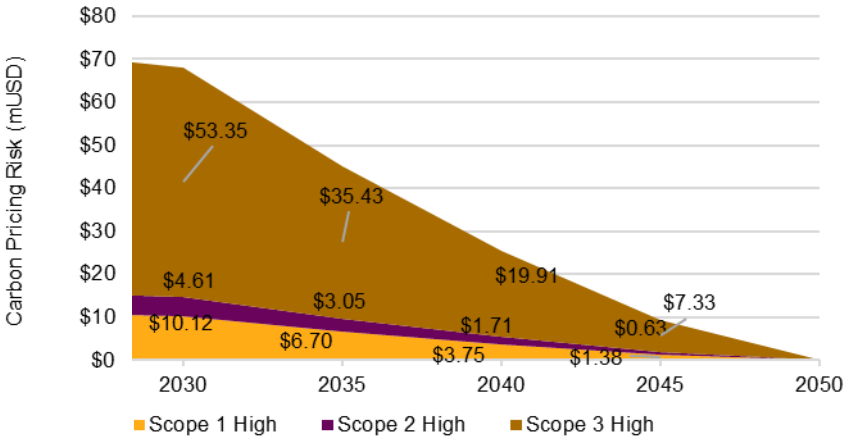
Figure 1: Carbon Pricing Risk at Enterprise Level



- In the high price scenario in 2030, the carbon pricing risk associated with upstream Scope 3 emissions accounts for about 78 percent of Thai Union's overall carbon pricing risk as displayed in **Figure 2**.

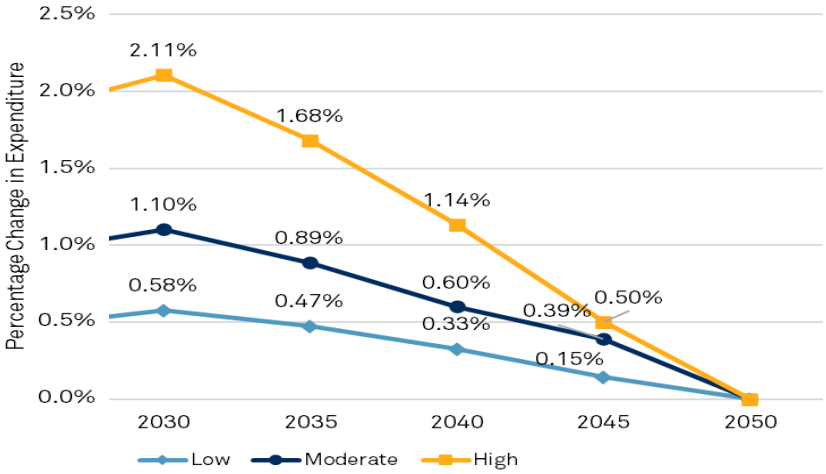
[4] The discount rate assumption of 7.7% that has been used.

Figure 2: Carbon Pricing Risk Breakdown by Scope for High Price Scenario



- The emergence of increasing taxes on fuel or GHG emissions may leave Thai Union with increased expenses which it may choose to either pass on to customers, absorb, or invest in lowering its emissions.
- **Figure 3** shows that Thai Union could face an increase in OPEX between 0.6 percent to 2.1 percent under the low to high carbon price scenarios respectively[5]. Under the high carbon price (2°C) scenario, the percentage change in operating expenditure is at 2.11 percent by 2030 and 1.14 percent by 2040.

Figure 3: Percentage change in OPEX at Enterprise Level



Market Risk

Climate change can impact the market through shifts in supply and demand for certain commodities, products, and services. Market risks involve changing customer behavior, uncertainty in market signals, and change in the cost of raw materials. These risks could trigger financial impacts through reduced demand for goods and services due to a shift in consumer preferences, increased production costs due to changing input prices and output requirements, abrupt and unexpected shifts in energy costs, a change in revenue mix and sources, etc.

[5] This assessment assumes Thai Union meets it target to reduce absolute Scope 1 + 2 + 3 emissions by 42% by 2030 and zero by 2050.

Thai Union's customers and suppliers, if faced with increased carbon taxes, may seek to pass these increases on by reducing their purchases or via higher priced products, respectively. This assessment, therefore, allows Thai Union to identify downstream and upstream parts of the value chain that are subjected to carbon pricing risks under the high carbon price (2°C) scenario, and help to identify ways of reducing exposure to these risks over time by a) determining how resilient customers are to these risks and b) exerting influence over its suppliers and encouraging its suppliers to reduce their own GHG emissions.

As a measure of market risk exposure, the increased carbon pricing risk associated with Thai Union's customers and suppliers under different carbon pricing scenarios has been calculated. The market risk was represented by a metric 'EBITDA at Risk', which allow us to estimate the forward-looking financial risk of Thai Union's customers and suppliers and assess the potential impact to a companies' earnings today if companies had to pay a future price for their greenhouse gas emissions.

Industries' potential exposure to carbon price is a function of current carbon taxes, emission trading schemes, and fuel taxes which are varied by industries and geographies. The carbon price is a proxy helping identify those sectors that are likely to come under increasing pressure from policy changes. A supplier's / customer's exposure to carbon price risk is calculated using the three-year trailing average EBITDA, the latest available emissions data, revenue by geography and combined with carbon pricing risk premium dataset to estimate how this could erode a company's margins.

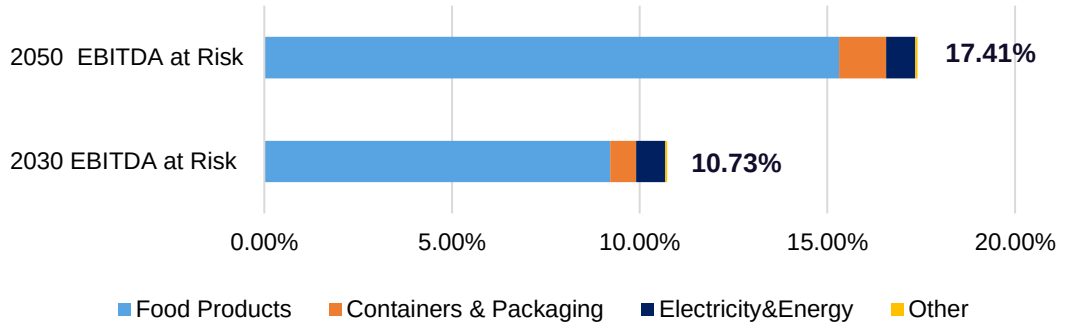
Supplier Market Risk Exposure

The supplier market risk is presented in the form of EBITDA at risk due to carbon pricing. The market risk analysis indicates that:

- The average percentage EBITDA at risk of Thai Union's Top 50 suppliers under high carbon price scenario in 2030 and 2050 are 10.73 percent and 17.41 percent, respectively. Thai Union's supplier market risk exposure is largely attributed to Food Products sector due to its substantial share in expenditure profile.
- Amongst Thai Union's supplier sectors, the Containers & Packaging faces the highest 2030 EBITDA at risk of 14.5 percent followed by the Food Products sector at 10.7 percent.

Figure 4 shows the average percentage of EBITDA at risk under the high carbon price (2°C) scenario for the top 50 suppliers.

Figure 4: Average Percentage EBITDA at Risk Top 50 Suppliers - 2°C scenario



Customer Market Risk Exposure

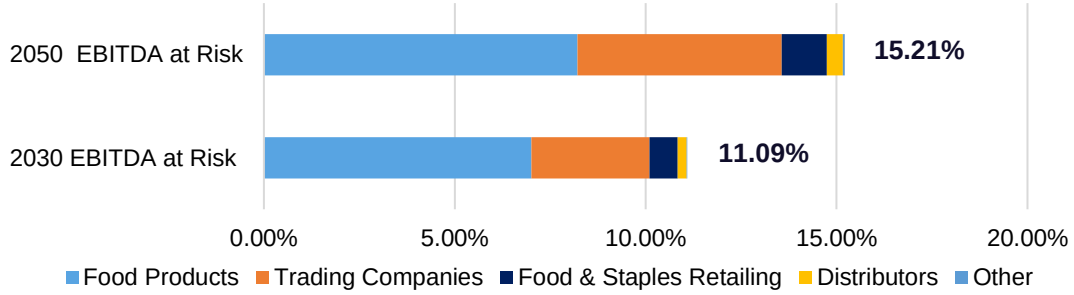
The customer market risk is presented in the form of EBITDA at risk due to carbon pricing. The market risk analysis indicates that:

- The average percentage EBITDA at risk of Thai Union's Top 50 customers under high carbon price scenario in 2030 and 2050 are 11.09 percent and 15.21 percent, respectively. Thai Union's customer market risk exposure is largely attributed to Food Products sector due to its substantial share in revenue profile.

- Amongst Thai Union's customer sectors, the Food Products sector faces the highest 2030 EBITDA at risk of 10.7 percent followed by Food & Staples Retailing at 8.5 percent by 2030.

Figure 5 shows the average percentage of EBITDA at risk under the high carbon price (2°C) scenario for the top 50 customers.

Figure 5: Average Percentage EBITDA at Risk Top 50 Customers - 2°C scenario



The risk from Thai Union's supplier and customer sectors is mostly low to moderate in 2030, with a rise being noticed in 2050. The overall risk is a function of the GHG footprint of these sectors, the health of companies' profit margins and their geographic exposure to unpriced carbon pricing risk. Therefore, any significant changes in these aspects will affect the market risk exposure of Thai Union**.** Future policy changes could impact the economics and viability of customers' business models. Increases in carbon pricing could erode their margins and their ability to procure products and services in a financially sustainable way; presenting an indirect revenue related risk.

Climate-related product certification and customer climate requirements for suppliers (Marine Stewardship Council, Aquaculture Stewardship Council, Best Aquaculture Practices, etc.) may as well present a challenge to Thai Union if the Company cannot source enough certified raw materials to meet the market demand. Additionally, increased climate action of downstream customers and requirements for suppliers could affect Thai Union's status as a preferred supplier amongst customers if Thai Union cannot meet the increased requirements.

Reputation Risk

Increasing awareness of the impacts of climate change has in part influenced customer or community perceptions of an organization's contribution to, or detraction from, a transition to a lower-carbon economy. The TCFD identifies increased stakeholder concern or negative stakeholder feedback as an example of climate-related reputation risk. The higher the overall reputation risk exposure facing a company, the more likely it is to face challenges regarding talent attraction and retention, long-term customer relationships, a license to operate and access to capital.

The overall climate-related Reputation Risk Exposure assessment is generated by combining a company's GICS Industry Group Impact Classification, S&P Carbon Global Standard decile ranking, Transition Pathway Alignment and Climate Strategy scores. These scores are averaged for each benchmark company to arrive at an overall reputation risk exposure score.

1) **The carbon intensity of Thai Union's business sector:** Based on a company's GICS industry the industry ranking relative to other industry performance in terms of carbon intensity. A higher likelihood of reputation risk is assumed for higher emitting industries. The relevant industry for Thai Union is 'Food, Beverage & Tobacco'.
2) **Thai Union and peers ranked in terms of carbon intensity:** Classified by S&P Carbon Global Standard and categorized as High, Medium, or Low impact, Thai Union's carbon intensity was measured against its peers on the spectrum of intensities within the Food, Beverage & Tobacco industry. A company performing better than its peers will be exposed to lower reputation risk.

3) **Alignment with the Paris Agreement:** The Paris Alignment assessment examines the adequacy of emissions reductions over time in meeting a carbon budget aligned with a 2°C warming pathway. It tracks company emissions and activity levels using historical data and projected future emissions. The difference between the cumulative emissions of a company and its carbon budget indicates how much over or under budget a company is with a 2°C warming scenario. The assumption here is that alignment with a 2°C warming pathway signals to the market and stakeholders that climate change is a strategic priority for the company, thereby improving public perception and lowering exposure to reputation risk.
4) **Ranking on climate strategy:** The Climate Strategy Score is a component of the S&P Global ESG Scores based on the Corporate Sustainability Assessment (CSA) process. The higher the climate strategy score of a company, the more developed its approach to addressing climate-related risks and opportunities in its business operations, and the less likely it is to face investor and other stakeholder pressure linked to these issues than would otherwise be the case.

Thai Union and its peers operate within the Food, Beverage & Tobacco GICS Industry Group which has a high carbon intensity. However, Thai Union's carbon intensity is considered medium. Thai Union and its peers all have a GHG Transition Pathway aligned with a >2˚C pathway. Thai Union has a high Climate Strategy Score. Based on the assessment of four pillars, **Thai Union has a *medium* level of exposure to reputation risk**, as shown in **Table 2**.

Table 2: Summary of reputation risk exposure

Company	GICS Industry Group	Carbon Global Standard Impact Classification[6]	Carbon Intensity Decile Ranking[7]	Transition Pathway Alignment[8]	Climate Strategy Score[9]	Overall Climate-related Reputation Risk Exposure
Thai Union Group PCL.	Food, Beverage & Tobacco	**High**	**Medium**	**Consistent with >2°C**	**High**	**Medium**
Peer 1	Food, Beverage & Tobacco	**High**	**High**	**Consistent with >2°C**	**High**	**High**
Peer 2	Food, Beverage & Tobacco	**High**	**Medium**	**Consistent with >2°C**	**High**	**Medium**
Peer 3	Food, Beverage & Tobacco	**High**	**High**	**Consistent with >2°C**	**Medium**	**High**

Technology Risk

The TCFD identifies substitution of existing products and services with lower emissions options, and costs to transition to lower emissions technology, as an example of climate-related technology risk. A preliminary analysis of technology risk exposure based on EU Taxonomy for sustainable activities shows that technology risk lies upstream in Thai Union's value chain. An in-depth analysis of technology exposure is immaterial as the risk stems from technology disruptions, including possible early retirement

[6] The Food, Beverage & Tobacco industry is considered to have high carbon impact from GHG intensity viewpoint.
[7] The company's carbon intensity decile ranking, relative to the S&P Carbon Global Standard
[8] Transition Pathway Assessment tracks the adequacy of a company's GHG emissions reductions made over time. The Scope 1 and 2 GHG transition pathway of the companies have been analyzed using the Gross Economic Value Added (GEVA) approach.
[9] Refers to Climate Strategy scores which is a subset of SAM S&P Global ESG Scores. The higher the climate strategy score of a company, the more developed its approach to addressing climate-related risks and opportunities in its business operations, and the less likely it is to face investor and other stakeholder pressure linked to these issues than would otherwise be the case.

of existing products or technologies to mitigate climate impacts, shall pass to stakeholders across the industry, making differences in technology risk exposure of Thai Union and its peers imperceptible.

4.3.2 Physical risks

Physical risks resulting from climate change can be acute (driven by an event e.g., floods or hurricanes) or chronic (arising from longer term shifts in climate patterns e.g., heatwaves or drought). These risks may have financial implications for organizations emanating from damage to assets, interruption of operations, reduced revenue from decreased production capacity, increased insurance premiums, reduced availability of insurance on assets in "high-risk" locations, and disruption to supply chains.

The Physical Risk assessment processes and analyzes atmospheric data (see **Figure 6**) related to temperature, precipitation, drought, wildfire, as well as other data related to coastal flooding, tropical cyclones, water stress, and fluvial flooding, combined with a sophisticated understanding of the vulnerability of each asset type to each type of hazard, factoring in the location of each asset, in order to provide a rigorous estimate of risk exposure under various conditions.

The financial impacts caused by climate change are measured in a metric known as 'Modeled Average Annual Loss (MAAL)', which reports financial losses on an annual basis. Its impact function begins with an analysis of the hazards facing specific assets. The asset's vulnerability to each hazard is then characterized based on asset type and specific ways ("impact pathways") in which a particular asset is impacted by a given climate hazard. Finally, impact functions, comprised of impact pathways, are assigned to model the risk based on the hazard[10] and vulnerability[11].

Figure 6: Physical Risk Indicators

Modeled Physical Hazards		Spatial Resolution	Coverage
	Temperature Extremes: Changes in frequency of occurrence of temperature extremes. A temperature extreme event is generally defined as the occurrence of the temperature variable above (or below) a threshold value near the upper (or lower) ends ('tails') of the range of observed values of the variable.	25 x 25 km	Global
	Coastal Flooding: Changes in frequency of coastal flooding of various magnitudes. Extreme coastal high water depends on average sea level, tides, and regional weather systems. Extreme coastal high water events are usually defined in terms of the higher percentiles (e.g. 90th to 99.9th) of a distribution of hourly values of observed sea level at a station for a given reference period.	100,000 Coastal Segments	Global
	Drought: Changes in the frequency of drought conditions contributing to a period of abnormally dry weather long enough to cause a serious hydrological imbalance.	25 x 25km	Global
	Wildfire: Changes in the annual probability of the 90th percentile wildfire conditions, as compared to the baseline period (1980-2000) at the asset's location. Sustainable 1 calculates a widely-used wildfire index driven by the localized climate model data.	25 x 25km	Global
	Tropical Cyclone: Changes in the location and intensity of hurricanes or tropical cyclones, the general term for a strong, cyclonic-scale disturbance that originates over tropical oceans. This is currently available for the eastern Atlantic basin.	25 x 25km	North Atlantic, North America, North-West Pacific, Asian-Pac
	Water Stress: Changes in the WRI Aqueduct water stress index from current values to future values out to the 2040s.	River Basin	Global
	Fluvial Flooding: The annual probability of a 100-year riverine flood, relative to the historical baseline of 1950-1999. This metric uses three climate variables and four topographic variables	25 x 25km	Global

The analysis shows that:

- In the 2030s, Thai Union has a Low level of physical risk in both scenarios, with a potential MAAL of USD 55 million and USD 66 million in the RCP 4.5 and RCP 8.5 scenarios,

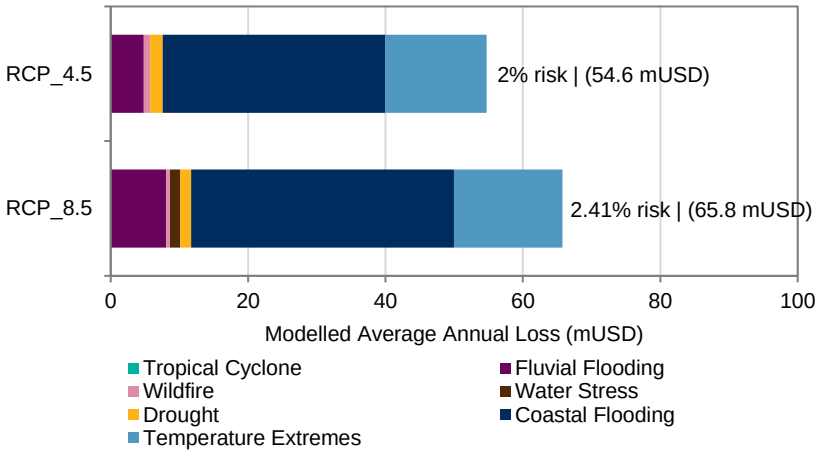
[10] Changes in environmental or economic conditions associated with climate change. These are expressed as specific metrics that change through time.

[11] Responses of an asset or entity to changes in the climate-related hazards. These are sensitive to the levels of the hazard metrics.

respectively. This translates into total asset value at risk at 2 percent and 2.41 percent, respectively, in the two scenarios (see **Figure 7**).

- While the vast majority of the total value of Thai Union's assets are considered to have a low level of risk to the hazards assessed, Temperature Extremes and Coastal Flooding are found to be the key contributors to the potential financial impact in both scenarios.
- Temperature Extremes and Coastal Flooding account for over 80 percent of the total absolute financial impact. The top three hazards which lead to absolute financial impact for Thai Union in 2030 are Coastal Flooding, Temperature Extremes, and Fluvial Flooding (see **Figure 8**).
- Maximum asset value concentration is in Thailand, making Thailand hold the maximum absolute risk. Ghana has the highest relative risk i.e., risk quantified as a percent of asset value.

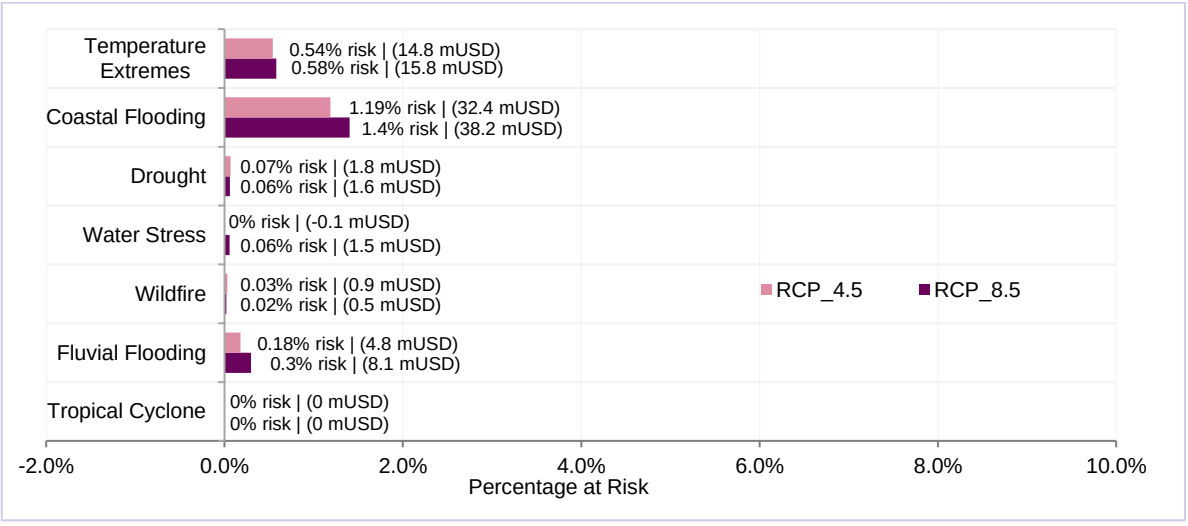
Figure 7: Modelled Average Annual Loss by Physical Risk Hazard (MAAL)



Absolute risk (in USD millions) is a function of *hazard x vulnerability x asset value*. This reflects the expected financial impacts in dollar terms. A very valuable asset with low hazard exposure and vulnerability could still hold substantial risk due to the high asset value.

Relative risk (in %) is a function of *hazard x vulnerability*. It is the risk exposure of an asset expressed relative to its asset value, reported as a percent of asset value (calculated as Modeled Annual Average Loss / asset value), it provides a perspective on exposure and vulnerability across assets, independent of their value. It's possible for low-value assets to have high relative risk

Figure 8: Physical Risk Drilldown for 2030



The assessment informs potential financial exposure resulting from the impairment or stranding of assets, effects on the value of assets and liabilities, and cost of business interruptions. Impact functions estimate the financial losses - including revenue, operating expenses, and capital expenditures - that a hazard of varying intensity would cause to a specific class of assets under a specific scenario over

various decades. A hazard might cause harm via diverse impacts, which would require multiple impact pathways to characterize it. For example, high maximum daily temperatures at a manufacturing facility could drive up cooling costs, degrade the HVAC system, and reduce the productivity of employees working inside.

4.4 Climate Strategy Framework

Thai Union has created a climate strategy to oversee the management of climate-related risks and opportunities, as well as the organization's commitment to establish Science-based Targets, in line with other Seafood Business for Ocean Stewardship (SeaBOS) members. Thai Union's greenhouse gas emissions reduction targets aligned with 1.5°C and net-zero have been approved by the Science Based Targets initiative (SBTi).

Thai Union has identified three key strategy pillars: **transition to a low-carbon organization, engage with value chain, and manage climate risks and opportunities.**

Thai Union has also identified four key enablers to support the implementation of the climate strategy, which bring together various functions to ensure that Thai Union's climate action doesn't occur in silos, as seen in **Table 3.**

Table 3: Key Enablers for Thai Union's Climate Strategy

Governance	Risk Integration
■ Integrate the climate agenda into governance at all levels, with regular Board engagement ■ Establish teams for the low-carbon transition and supply chain management ■ Integrate climate performance KPIs into governance remuneration and incentives	■ Develop location-specific climate risk and opportunity metrics, including internal carbon pricing ■ Implement and integrate climate risks and opportunities into financial planning (e.g., capital expenditures (CAPEX)) and enterprise risk management
Data Management	**Transparency and Compliance**
■ Improve the GHG emissions data management system to incorporate Scope 3 progress monitoring ■ Improve Scope 3 GHG data collection to be supplier specific, where possible ■ Manage climate-related risk data ■ Monitor and report progress towards achievement of climate-related targets	■ Continue third party verification of emission disclosures ■ Commit to and continuously strengthen TCFD disclosure ■ Publish a full GHG Protocol compliant inventory on an annual basis

4.4.1 Transition to a Low-Carbon Organization

To drive climate strategy implementation, Thai Union will strengthen internal resources to enable the implementation of low-carbon energy on-site and regularly review existing targets, as per the Science Based Targets initiative requirements. Under this pillar, Thai Union has identified two focus areas and key supporting initiatives as seen in **Table 4**.

Table 4: Focus Areas for the Transition to a Low-Carbon Organization Pillar

Growing Renewables Consumption	Use of Low-Carbon Production Technologies
■ Switch fuel for fossil-fuel based machinery, e.g., boiler electrification ■ Adopt electric vehicles to reduce mobile fuel usage ■ Increase the share of electricity from renewable sources, supported by purchasing of renewable energy certificates	■ Use the best available technologies ■ Increase the use of zero-emission refrigerants ■ Green growth, where business/ production grows without increasing GHG emissions per unit of production

Thai Union already tracks its energy consumption and carbon footprint annually to identify the amount of GHG emitted by corporate activities.

In an effort to address climate risks and opportunities within its own operations, Thai Union has incorporated the Transition to Low-Carbon Organization Pillar into its climate strategy. The pillar aims to decarbonize its operations and reduce the potential impact of transition risks, such as a carbon tax and reputational risks.

4.4.2 Engage With Value Chain

Alongside the responsibilities in the first pillar, the Sustainable Development team will also pursue climate actions throughout the supply chain by engaging with key suppliers. Under this pillar, Thai Union has also identified two focus areas and key supporting initiatives as seen in **Table 5**.

Table 5: Focus Areas for the Engage with Value Chain Pillar

Supporting Internal Processes	Engaging With Key Parties
■ Develop and communicate the updated supplier code of conduct with climate requirements ■ Develop IT systems for data collection and progress monitoring	■ Identify key suppliers and engage in climate change action ■ Build awareness and run education campaigns to promote the need for change ■ Support suppliers with emission reduction initiatives, such as fuel switching of fishing vessels, sustainably sourcing feed for shrimp aquaculture, and reducing electricity consumption of suppliers ■ Engage with investee companies to start collecting and reporting investee Scope 1 and Scope 2 emissions

This year, Thai Union has also set out to calculate its Scope 3 inventory in an effort to identify mitigation opportunities in the value chain. Purchased goods and services – particularly procured seafood – makes up a significant portion of Thai Union's Scope 3 inventory. As such, Thai Union's mitigation efforts will be primarily focused on reducing emissions from this source, particularly wild caught tuna and farmed shrimp, to reduce the impact of potential transitional risks that may occur along the supply chain.

4.4.3 Manage Climate Risks and Opportunities

Thai Union also seeks to drive its climate ambition through integrating the assessment of climate-related risks and opportunities into the Corporate Risk Management and Strategy Functions, including decision-making processes and financial planning. Under this pillar, Thai Union has also identified two focus areas and key supporting initiatives as seen in **Table 6**.

Table 6: Focus Areas for the Manage Climate Risks and Opportunities Pillar

Climate Adaptation	Climate Integration
■ Screen portfolios to estimate risks from natural hazards, and track risks at a country level ■ Quantify risks of financial impacts at an asset level ■ Develop a site-level impact assessment and plans, especially for water scarcity ■ Assess climate risks on the supply chain, including physical impacts of climate change on marine ecosystems and cascading implications	■ Screen portfolios, analyze transition risks and opportunities, and determine financial impacts to the business ■ Include material climate risks and opportunities in business strategy and financial planning considerations ■ Pursue identified climate opportunities under the Transition to a Low-Carbon Organization Pillar

Thai Union has developed an overarching plan to respond to climate risks, which includes developing a context-specific risk assessment and adaptation plan. The process for risk mitigation and adaptation will be as follows:

- **Portfolio Screening and Hotspot Analysis:** Estimation of climate-related risks for each of Thai Union's assets, using publicly available data
- **Risk Validation and Quantification:** High-level financial analysis of asset-level risks
- **Impact Assessment and Adaptation:** Develop a detailed site-level assessment and mitigation/ adaptation strategies

Responses to climate risks

In response to climate-related risks identified, Thai Union is working in parallel to develop context-specific analysis and adaptation plans by addressing the following dimensions (see **Table 7**). Thai Union has announced its commitments to reduce GHG emissions which in turn leverage the magnitude of carbon pricing risk from more stringent regulations on carbon and concurrently monitored emerging climate-related regulations in different geographies to assess in later steps the impact of regulation changes to its business and make well-informed decisions to mitigate potential financial impacts. On physical risks, Thai Union has a global disaster event alert in place to closely monitor and respond to natural hazard events.

Table 7 Thai Union's Responses to Climate-related Risks

Climate-related Risks	Responses to Climate-related Risks
Transition Risks	■ Committed to taking urgent climate action and its greenhouse gas emission reduction targets aligned with 1.5°C and net-zero, as presented in SeaChange® 2030. Meeting the targets will decrease carbon pricing risk exposure because as the emissions reduce so does the magnitude of carbon pricing risk facing Thai Union.

Climate-related Risks	Responses to Climate-related Risks
	■ Monitor changes in laws and regulations related to climate change including greenhouse gas emissions. GSHE expects to conclude phase 1 regulatory monitoring in 2023.
Physical Risks	■ Tracking climate risks at a country level through Thai Union's corporate risk assessment on a quarterly basis. The following key risk indicators are tracked: ○ Actual natural hazard event's impact to TU facilities in the previous quarter, including earthquakes, tropical cyclones, floods, volcanoes, droughts. ○ Mid-term and long-term risk trend level, including earthquake, flood, tsunami, tropical cyclone, droughts. ■ Adaptation measures to address specific climate-related risks, e.g., water scarcity, given that 'drought' is a key physical climate risk. The following key risk indicators are tracked: ○ KPIs to reduce water usage ○ Plans for alternative water sources ○ Emergency plans in cases of flooding at each site ■ Preparedness for natural disasters through INFORM process: ○ Thai Union is utilizing the INFORM process to support decision-making for risk responses based on quantitative and analytical indices

As the physical impacts of climate change have become more apparent over the past several years, Thai Union has identified vulnerabilities relating to the procurement of tuna and shrimp. In the coming years, Thai Union will seek to conduct a deeper assessment of the impact of climate change on wild caught tuna supply and shrimp aquaculture production, and the potential risks it may pose to Thai Union's supply chains. Preliminary considerations include the impact of rising water temperatures, which may result in the migration of tuna stocks and breeding grounds, as well as ocean acidification, which scientific studies have found to be correlated with decreased growth and survival of yellowfin tuna. This may result in lower yields in fisheries that Thai Union currently procures tuna from, or higher fuel usage for fishing vessels and transportation costs, which may also impact Thai Union's Scope 3 GHG emission reduction efforts. Similarly, rising water temperatures are expected to have negative impacts on shrimp aquaculture, as higher evaporation rates may increase pond salinity, impacting shrimp growth and likelihood of pathogens and disease outbreaks. The potential increase in coastal floods could also disrupt shrimp farming activities located near the coastlines. This may lead to risks of supply shortages or increased procurement costs due to low supply. In order to integrate climate-related risks and opportunities into Thai Union's business strategy and decision making, Thai Union plans to conduct more in-depth assessments in the future.

Responses to climate opportunities

Thai Union has identified climate-related opportunities across four areas comprising resource efficiency, energy sources, product and services, and market, presented in **Table 8** below.

Table 8: Thai Union's Climate Transition Opportunities

Climate Opportunities	
Resource Efficiency	Proactively adopting voluntary agreements on climate change mitigation can enable Thai Union's business and operation to be more energy efficient and therefore more resilient. This may help reduce OPEX.
Energy Sources	Identifying and implementing renewable energy sourcing can help reduce costs from traditional fuels (which may have higher costs). May increase capital expenditures (CAPEX) in the short term, but likely to save OPEX in the long term.
Products and Services (Development of low-carbon food products)	Increasing consumer demand for healthy and climate-friendly diet choices increases Thai Union sales of new and innovative products. These products include: (a) Seafood products, recognized as having a lower emissions footprint versus other animal-based protein (b) Alternative proteins, particularly the 'alternative seafood' category, e.g., cell-based/lab-grown, plant-based tuna and crab
Market	Increasing access to capital through the use of sustainability-linked, green and blue finance instruments that couple sustainability performance targets and investment projects' results with interest rates and other financing terms.

5. METRICS AND TARGETS

Thai Union utilizes its own environmental data collection tool across the Group, which collects data based on location, according to Factory, Farm & Hatcheries, and Office, as is reported in the Sustainability Report.

The calculated Scope 1 and 2 GHG emissions in fiscal year (FY) 2021 serves as a base year from which we develop our near-term and long-term SBTi-aligned emissions targets. Thai Union has also calculated Scope 3 GHG emissions in an effort to better understand value chain emissions and direct value chain climate action. In line with Thai Union's climate ambitions, we conducted a screening assessment of Scope 3 emissions using FY2021 and have calculated relevant Scope 3 categories in line with specifications from the GHG Protocol. Our mixed methodology approach prioritizes average data methods for calculating material categories, such as Purchased Goods and Services, while relying on spending-based data for less relevant categories, such as Business Travel. We seek to use the FY2021 inventory as a base year from which we will establish Scope 3 emission targets in line with the Science Based Targets initiative. As we establish and mature our supplier engagement program, we seek to use supplier specific emission factors to report our value chain emissions and monitor our progress more accurately.

5.1 Climate-related Metrics – GHG Emission Data

Thai Union has performed a screening of relevant Scope 3 emission categories based on FY2021 data, which will be used as the base year for setting Science Based Targets. An updated Scope 3 inventory FY 2022 is shown is **Table 9**. The breakdown of Thai Union's greenhouse gas emissions Scope 3 can be found on Sustainability Performance Data 2022[12].

Table 9: GHG Emissions Data for Thai Union

Performance	Unit	2019	2020	2021*	2022
Scope 1 GHG Emissions	**Metric tons CO_2e**	337,317	317,453	323,493	294,721
Scope 2 GHG Emissions	**Metric tons CO_2e**	172,424	186,852	188,119	180,703
Scope 3 GHG Emissions	**Metric tons CO_2e**	N/A	N/A	4,071,680	3,555,070
			Total GHG emission (tCO_2e)	4,583,292	4,030,494

**The revision reflects suggestions from SBTi.*

In 2022, emissions from purchased goods and services accounted for approximately 70 percent of Scope 3, where the largest sources of Thai Union's emissions come from tuna, shrimp and packaging. These three hotspots will be the focus of our decarbonization efforts as we move forwards.

[12] https://www.thaiunion.com/files/download/sustainability/sd-report-2022-en.pdf

5.2 Climate-related Targets

Emissions reduction targets – in line with the SBTi

- **Overall Net-Zero Target**

  Thai Union Group Public Company Limited commits to reach net-zero greenhouse gas emissions across the value chain by 2050. This aligns with the Business Ambition 1.5°C pathway.

- **Near-Term Targets**

  Thai Union Group Public Company Limited commits to reduce absolute Scope 1 and 2 GHG emissions by 42 percent by 2030 from a 2021 base year.* Thai Union Group Public Company Limited also commits to reduce absolute Scope 3 GHG emissions from purchased goods and services, fuel and energy related activities, and upstream and downstream transportation and distribution 42 percent within the same timeframe.

- **Long-Term Targets**

  Thai Union Group Public Company Limited commits to reduce absolute Scope 1 and 2 GHG emissions by 90 percent by 2050 from a 2021 base year.* Thai Union Group Public Company Limited also commits to reduce absolute Scope 3 GHG emissions from purchased goods and services, fuel and energy related activities, upstream and downstream transportation and distribution, end of life treatment of sold products, and investments by 90 percent within the same timeframe.

*The target boundary includes land-related emissions and removals from bioenergy feedstocks.

Responsible aquaculture climate-related targets

- We are committed to **sourcing 100 percent farmed shrimp and its feed from responsible production sources** that meet industry credible standards or are in an improvement program that minimizes the impact on the surrounding ecosystem, including reducing the risk of deforestation, by 2030.

Responsible agriculture climate-related targets

- We are committed to **sourcing palm oil used for Thai Union branded products from certified sustainable sources,** such as those certified by the Roundtable on Sustainable Palm Oil (RSPO) or equivalent, ensuring zero deforestation and conversion across the entire supply chain by 2030.

  From the end of 2021, mass balance supply chain RSPO certification or a higher level of certification (segregated or identity preserved) is accepted, with a preference for segregated or identity preserved. By 2025, all palm oil sourced shall meet segregated or identity preserved RSPO or equivalent requirements. Palm oil shall not originate from areas of deforestation.

Ecosystem restoration climate-related targets

- We are committed to **allocating 250 million THB for the protection and restoration** of critical ecosystem where Thai Union or our supply chain operates to create a positive impact on the health of carbon sinks.

Other climate-related targets

- We will ensure **100 percent of our branded packaging is reusable, recyclable,** or **compostable** by 2025, where there will be **30 percent average recycled content** in our branded packaging, and advocate for at least 60 percent of private label products be sustainably packaged by 2030.
- We will **reduce food loss** across our ambient, frozen and chilled seafood operations by 50 percent by 2025, compared to a 2021 baseline.
- We will **eliminate food waste, waste to landfill, and water discharge** at our five keys processing facilities by 2030.
- Through our sustainability-linked financing framework, we have obtained the first ever sustainability-linked bond in Thailand and sustainability linked loans in Thailand and Japan. We have incorporated climate change into our Sustainability Performance Targets (SPTs) aiming to reduce **Thai Union's Scope 1 and 2 manufacturing operations' emissions intensity by 4 percent annually to meet 2023 (carbon intensity Scope 1 & 2 of 0.64) and 2026 (carbon intensity Scope 1 & 2 of 0.56) targets** against a baseline of 2019 (SPT 2). Progress against these targets will be measured with the carbon intensity of finished goods (Key Performance Indicator 2). Please visit our Sustainability-Linked Financing Framework for further details[13].

[13] Sustainability-Linked Financing Framework https://investor.thaiunion.com/misc/flipbook/index.html?id=244261