IFRS SUSTAINABILITY DISCLOSURE STANDARD

IFRS S2 Climate-related Disclosures

PTT GLOBAL CHEMICAL

JUNE 2024

Sustainability is our business

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IFRS S2 Framework

Climate-related Disclosures

PTT Global Chemical (GC) strives to explore new and effective sustainable pathways to drive continuous improvement across environmental, social, and governance dimensions. In line with the UN Sustainable Development Goals (SDG), particularly SDG 7: Affordable and Clean Energy and SDG 13: Climate Action, we have set ambitious targets to reduce greenhouse gas (GHG) emissions and **achieve net zero GHG emissions by 2050**, as well as other climate-related targets to inform our business direction.

With increasing impacts from climate change, GC recognizes the importance of understanding and managing climate-related risks and opportunities to the sustainability of our business. Then, to effectively communicate GC's climate change management in a robust, comparable, and verifiable manner, IFRS S2 (Climate-related Disclosures standard) could support those essential properties. It provides more comprehensive disclosures on identifying, assessing, and managing climate-related risks, as it integrates all TCFD recommendations and adds additional requirements, enhancing transparency and strategic decision-making for companies.

Therefore, GC has assigned climate-related responsibilities to its governing body and conducted climate risks and opportunities assessment against various climate scenarios (i.e. scenario analysis) covering physical and transition risk drivers. In response to identified risks, GC developed precautionary measures and enforces robust risk and crisis management approaches to manage and minimize risks.

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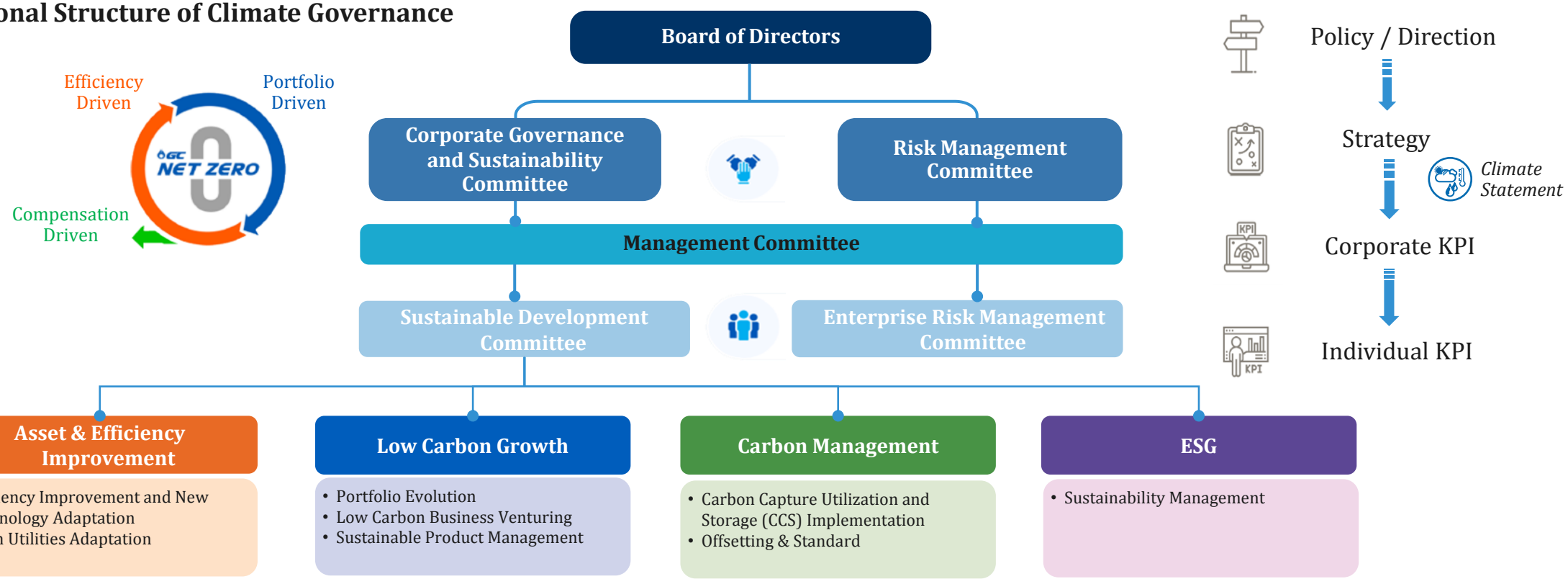
Governance

GC has established a decarbonization governance and management structure, covering from director level through to operational level, to enable integration and efficiency in all processes according to the company's Net Zero Target. In this regard, GC has appointed board-level Corporate Governance and Sustainability Committee (CGS) to oversee climate-related issues thru quarterly meetings. CGS is supported by Sustainability Development Committee (SDC), as an executive-level committee, chaired by Executive Vice President of Sustainability, as the highest level Sustainability executive officer as a chairman for the committee. SDC's responsibility is to govern strategic directions for mitigation of climate change-related issues. These include GHG reduction target setting, refinement of project investment plans by emphasizing reducing GHG emissions, etc. The SDC, which has highest-level sustainability executive officer as a chairman for the committee, also determine plans, practical applications, and measurement systems for the operational integration required to achieve decarbonization and sustainable development on an organizational level.

Organizational Structure of Climate Governance



Governance

The governance body(s) responsible for oversight of climate-related risks and opportunities

The governance bodies or individuals responsible for oversight of climate-related risks and opportunities.

Governing Body	Roles and Responsibilities	Meeting Frequency
Board Chair	The Board Chair holds the most power and authority on the board of directors (BoD) and is responsible for ensuring that the business has a clear picture of its exposure to climate-related risks and opportunities associated with the transition towards a low carbon economy and the physical impacts of climate change on the organization. This is reflected through GC's vision, missions, directions, and operational strategies which is endorsed by the board. The Board Chair is also responsible for reviewing the performance of executives under an efficient performance monitoring and evaluation system. The Board chair oversees the CGS and the RMC and governs the decision-making on climate-related issues.	As needed
Corporate Governance and Sustainability Committee (CGS)	The CGS reports directly to the BoD in accordance with the duties and responsibilities assigned to them. Climate-related issues that affect the whole company, including energy efficiency, alternative raw material sourcing, GHG mitigation, and GHG reduction targets, are evaluated and reviewed by the CGS.	Quarterly
Risk Management Committee (RMC)	The RMC is responsible for defining the direction of risk management guided by the risk appetite, risk policy, and five risk management frameworks: corporate, foreign exchange, price-and spread, subsidiaries, and investment (capital expenditures, acquisitions). It is also tasked with monitoring and providing recommendations on the management of risks towards the achievement of GC's strategic and business goals. BoD's responsibility is to oversee corporate risk management by monitoring progress and RMC' s performance at least quarterly, and to report results to shareholders through GC One Report. The RMC is responsible for defining comprehensive key risk management policies and practices, which include climate-related risks. The RMC assesses and reviews risks, considering both internal and external factors, which may affect the achievement of our goals in order to ensure that appropriate measures to tackle climate change, which are also in line with our business context, have been put in place.	Quarterly

Governance

The governance body(s) responsible for oversight of climate-related risks and opportunities

GC conducts regular assessments of the board of directors' skills and competencies to identify members capable of addressing climate-related challenges. Relevant skills might include, but not limited to sustainability, enterprise risk management, energy industry, and materials industry. These skills are closely aligned with climate-related competencies. GC continuously examines and consider which board of directors possess the necessary capabilities or require further development to address climate issues. This systematic approach aids in building a resilient and forward-thinking board of directors to oversee strategies designed to respond to climate-related risks and opportunities proactively.

Governing Body	Members	Relevant Skills
Board Chair	Mr. Predee Daochai	• Energy industry • Sustainability • Enterprise risk management
Corporate Governance and Sustainability Committee (CGS)	• General Nimit Suwannarat (Chairman of CGS) • Mr. Patchara Anuntasilpa • Police Colonel Dusadee Arayawuit • Mr. Wim Rungwattanajinda	• Sustainability • Enterprise risk management
Risk Management Committee (RMC)	• Mr. Grisada Boonrach (Chairman of RMC) • Mr. Petai Mudtham • Mr. Noppadol Pinsupa • Mr. Cherdchai Boonchoochauy • Mr. Narongsak Jivakanun	• Energy industry • Materials industry • Sustainability • Enterprise risk management

Source: Board of Directors | PTT Global Chemical (pttgcgroup.com)

Governance

Management's role in the governance processes, controls and procedures used to monitor, manage and oversee climate-related risks and opportunities

The governance bodies or individuals responsible for oversight of climate-related risks and opportunities.

Managing Body	Roles and Responsibilities	Meeting Frequency
Sustainability Development Committee (SDC)	The SDC is chaired by Executive Vice President of Sustainability, as the highest-level Sustainability executive officer, with dedicated responsibility for governing ESG topics, as well as managing climate-related issues. The SDC has diverse responsibilities, including: 1) Formulate and review policies, strategies, and goals related to decarbonization, as well as the growth in low-carbon business and the sustainable development of the GC's business direction, ensuring a balance in environmental, social, and governance (ESG) aspects, as well as compliance with best practices according to international standards. 2) Supervise, vet, approve, and/or provide comments on investment proposals for various projects of the GC group, particularly when the investment returns are significantly affected by internal carbon pricing mechanisms.	Quarterly

Governance

Management's role in the governance processes, controls and procedures used to monitor, manage and oversee climate-related risks and opportunities

The governance bodies or individuals responsible for oversight of climate-related risks and opportunities.

Managing Body	Roles and Responsibilities	Meeting Frequency
Enterprise Risk Management Committee (ERMC)	The ERMC reports to the MC and is assigned to closely monitor risk management performance on a monthly basis. The ERMC was established to ensure that risk management measures are aligned with strategic management and company objectives under the company's risk appetite and the RMC's guidance. The ERMC members comprises executive officers from each business function who have accountability in risk governance and implementation, risk enforcement, and company-wide risk management. The 'Risk Function' unit under ERMC oversees the Corporate Risk Management and Internal Control System Department (S-RC). The S-RC reports directly to the Corporate Strategy Function Head and is independent from other business units and functional units. The S-RC is responsible for: 1) Deployment of risk governance, policies, and frameworks as approved by the RMC; 2) Monitoring of risk management progress and regularly reports to the risk committee at both the operational level (ERMC) and BoD level (RMC); 3) Advising risk management to business units, functional unites, and subsidiaries; and 4) Ensuring frameworks are in line with international standards and guidelines. GC implements the Three Lines of Defense model.	Monthly

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Strategy

Climate-related risks and opportunities that reasonably expected to affect the entity's prospects

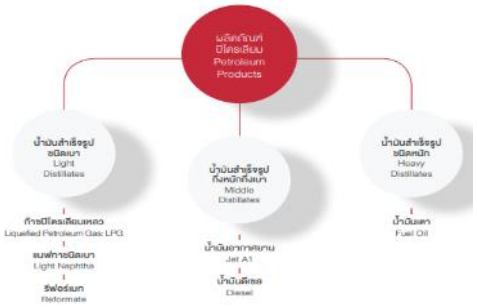
In line with the Paris Agreement which aims to limit global warming to well below 2°C from pre-industrial levels and pursue efforts to further limit warming to 1.5°C, we have developed and adopted the GC Net Zero Pathway with the ambition to achieve Net Zero emissions by 2050. To drive our ambition, GC's risk management team, strategy development team, environmental management team, and sustainability management team regularly assesses climate-related risks and opportunities and integrates results into our business strategy to mitigate and adapt to climate-related impacts.

In 2023, GC has conducted both physical and transition climate scenario analyses qualitatively and quantitatively by taking context-specific factors applicable to each of GC's assets into consideration to identify the possibility and severity of potential climate-related impacts.

The analyses cover our own operations, upstream (i.e., natural gas and crude oil suppliers, etc.), and downstream (i.e., key customers, etc.) value chain segments. The spatial scope of our assessment covers the majority of GC's assets which operates across four provinces in Thailand including:

- Rayong – Own operations; Critical tier 1 feedstock supplier (Upstream)
- Chonburi – Own operations
- Samut Prakan – Major client (downstream)
- Samut Sakhon – Major client (downstream)

Upstream (Raw Material – Natural Gas, Crude Oil)



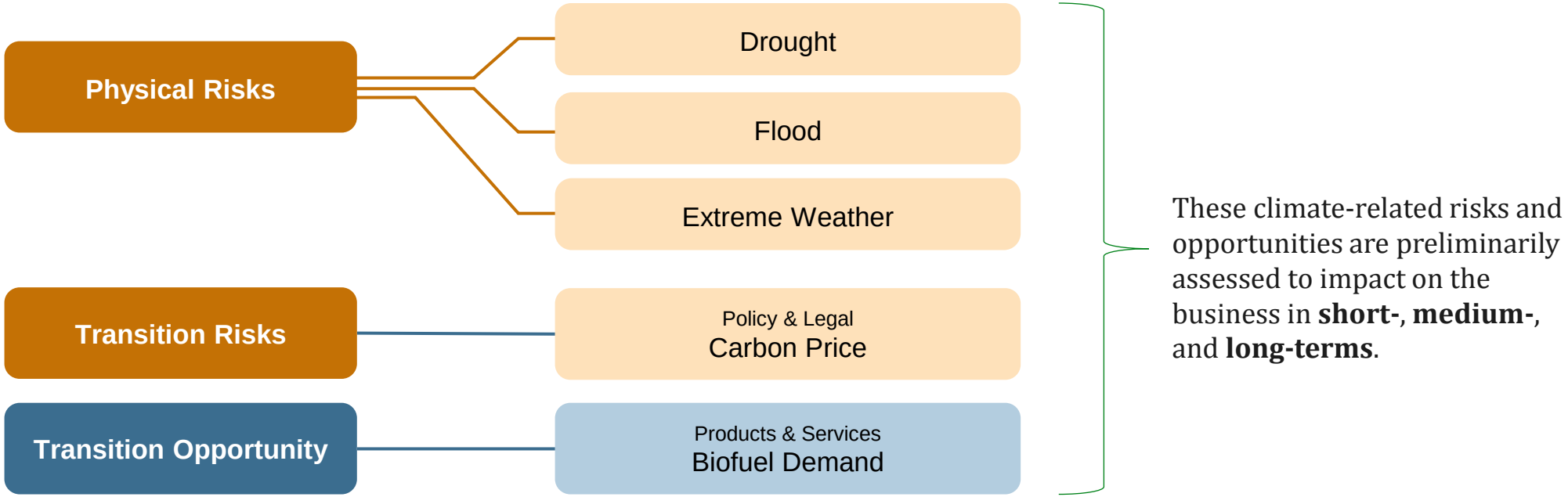
Own Operation and Downstream (Key Customers)

Strategy

Climate-related risks and opportunities that reasonably expected to affect the entity's prospects

This year, after reviewing the previous year's physical scenario analysis, we concluded that the assessment results were still relevant to GC's context. Instead, we have updated our transition scenario analyses using two new scenarios for two drivers including carbon price and change in biofuel demand which is a new driver for this year.

Further details of the analyses are provided in subsequent sections.



The temporal scope of our assessments was in line with the expected lifetime of our assets. We have defined three timeframes, which were used consistently throughout our analyses, as well as management measures, adaptation plans, and financial planning. The timeframes comprise short-term (base case - 2022), medium-term (2030), and long-term (2050).

Strategy

Current and anticipated effects of those climate-related risks and opportunities on the entity's business model and value chain

In accordance with GC's business model, which primarily involves manufacturing and engineering operations, identified physical climate risks such as droughts, floods, and extreme weather events have the potential to impact GC's operations significantly. These operations rely on stable and durable physical assets to produce valuable products. Therefore, all plants within the scope of assessment are susceptible to being significantly affected by these physical climate risks. Below are detailed considerations of exposure to these **physical risks**:

- **Floods** could damage power lines, substations, and renewable energy infrastructure. Extended power outages also resulting from flooding can disrupt operations for days or weeks, severely impacting customer service and production.
- **Droughts** conditions can disrupt operations that rely on water as a critical input. These conditions may affect manufacturing processes, agricultural operations, and other water-dependent activities, potentially leading to supply chain disruptions and reduced productivity.
- **Extreme Weather** could damage transportation infrastructure, warehouses, production facilities, and power generation.

Additionally, the **transition climate risk** e.g., **Carbon Price** and **Biofuel Demand**, extremely influence GC's business strategy as their core businesses and products related to Petroleum, Aromatics, Olefins, Polymers, EO-Based Performance, Green Chemicals, Phenol, Acrylonitrile, Propylene Oxide, etc.

- **Carbon pricing** may increase costs for products reliant on fossil fuel extraction and processing, potentially driving interest in bio-based alternatives.
- **Demand for biofuel** could stimulate innovation in bio-based production methods and lead to competition with traditional petroleum-derived products. Shifts towards bio-materials may impact supply chains and production costs, particularly for polymers and chemicals heavily reliant on fossil fuel feedstocks. Ultimately, these factors highlight the growing importance of sustainability and the need for industries to adapt to changing market dynamics.

Hence, the identified physical risks are expected to have a significant impact, primarily on the provinces of Rayong, ChonBuri, Samutprakan, and Samutsakorn. Similarly, the transition risks are anticipated to predominantly affect Thailand as a whole.

Strategy

the effects of those climate-related risks and opportunities on the entity's strategy and decision-making

Physical Scenario Analysis (Overview)

Physical risks resulting from climate change can be acute or chronic. Physical risks may have financial implications for companies, such as direct damage to assets and indirect impacts from supply chain disruption. Companies' financial performance may also be affected by changes in water availability, sourcing, and quality; food security; and extreme temperature changes/wind speed affecting companies' premises, operations, supply chain, transport needs, and employee safety.

Risk	Indicator	IPCC Scenario	Timeframe	Description / Criteria	Tool
Drought	Rainfall	RCP* 2.6, 4.5, 8.5	2030 - 2050	• The projection of rainfall data conducted by climate model CMIP 5** has been generated over Thailand and focus on Chonburi and Rayong Province • Standard Precipitation Index (SPI) has been calculated and use as the factor to indicate drought and flood year	AQUEDUCT THE CLIMATE EXPLORER
Flood	Rainfall	RCP 2.6, 4.5, 8.5	2030 - 2050		
Extreme Weather	Rainfall Wind speed	RCP 2.6, 4.5, 8.5	2030 - 2050	• The projection of rainfall and wind speed data conducted by climate model CMIP 5 have been generated over Thailand and focus on Chonburi and Rayong Province (Upstream) • The frequency of tropical cyclone categories 1-5 have been counted and projected	THE CLIMATE EXPLORER ScienceDirect ResearchGate

The following Representative Concentration Pathways (RCP) (i.e., scenarios, etc.) from the IPCC were included in our physical scenario analysis.

Scenarios	Description	Global Mean Temperature Change	Maintain at 2.0 C by 2050
RCP 2.6	• Mean Radiative forcing at earth surface is 2.6 W/m^2; • High effort on the implementation of decarbonization • Medium intensity & low frequency in extreme weather	1.6 C in 2050	Possible
RCP 4.5	• Mean Radiative forcing at earth surface is 4.5 W/m^2; • Medium effort on the implementation of decarbonization • Medium intensity & medium frequency in extreme weather	2.4 C in 2050	Possible, with high uncertainty
RCP 8.5	• Mean Radiative forcing at earth surface is 8.5 W/m^2; • Low effort on the implementation of decarbonization • High intensity & high frequency in extreme weather	4.3 C in 2050	Not Possible

Remark:
*RCP – representative concentration pathway,
**CMIP- Coupled Model Intercomparison Project

Strategy

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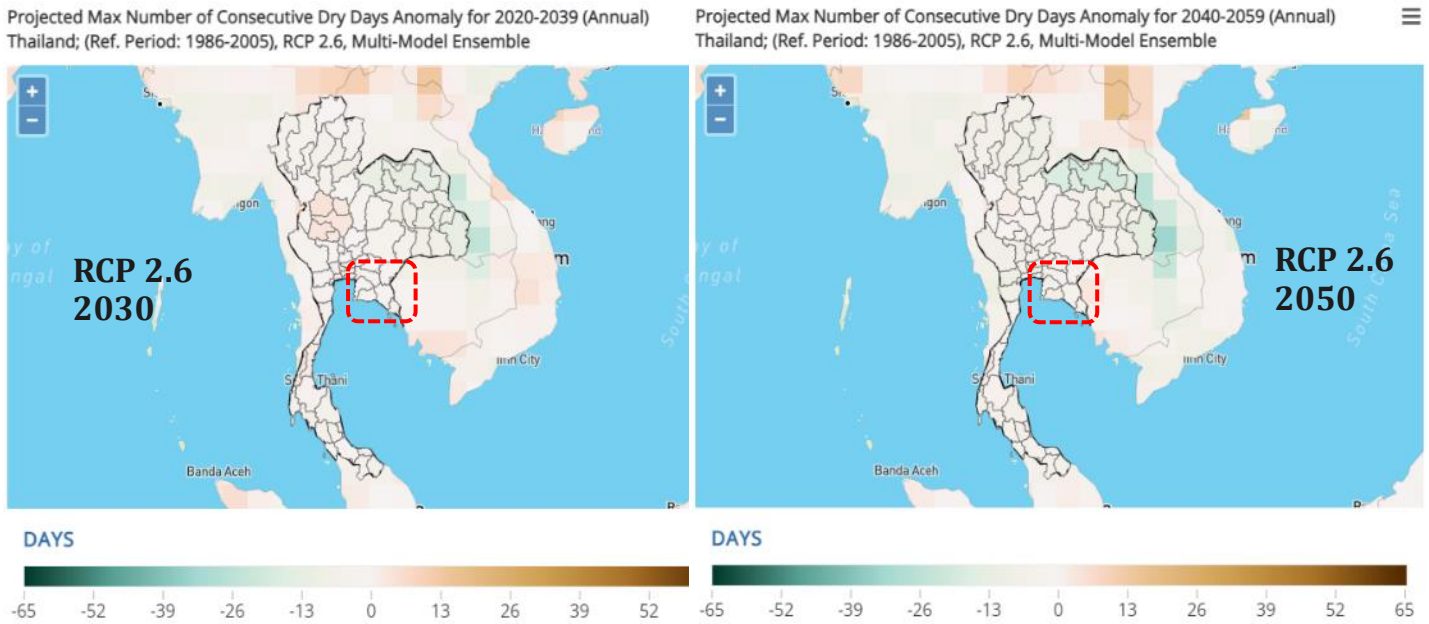
Physical Scenario Analysis

Qualitative Assessment: Drought

Thailand: Projection of Consecutive Dry Days

https://climateknowledgeportal.worldbank.org/



The number of consecutive dry days is likely to decreases in long-term

Impacts on Business	Examples of Risks
• Existing water shortages and constraints on the water supply • Insufficient water supply, worsening both severe harm and economic impact	• The drought in 2020 and 2005 affected large swathes in the East, where three provinces as Chachoengsao, Chon Buri, and Rayong. Drought was likely to limit production, only 7% of water at Rayong reservoir. Luckily that the situation was recovered on time.

Risk Score Color Key			
Higher Risk	Mod. Risk	Lower Risk	Limited

Baseline

No.	Asset	Drought
1	Rayong: GC Operations, and GC's Suppliers	
2	Chonburi: GC Operation	
3	Samutprakan: Customer	
4	Samutsakorn: Customer	

RCP 2.6

No.	Asset	Drought	
		2030	2050
1	Rayong: GC Operations, and GC's Suppliers		
2	Chonburi: GC Operation		
3	Samutprakan: Customer		
4	Samutsakorn: Customer		

RCP 8.5

No.	Asset	Drought	
		2030	2050
1	Rayong: GC Operations, and GC's Suppliers		
2	Chonburi: GC Operation		
3	Samutprakan: Customer		
4	Samutsakorn: Customer		

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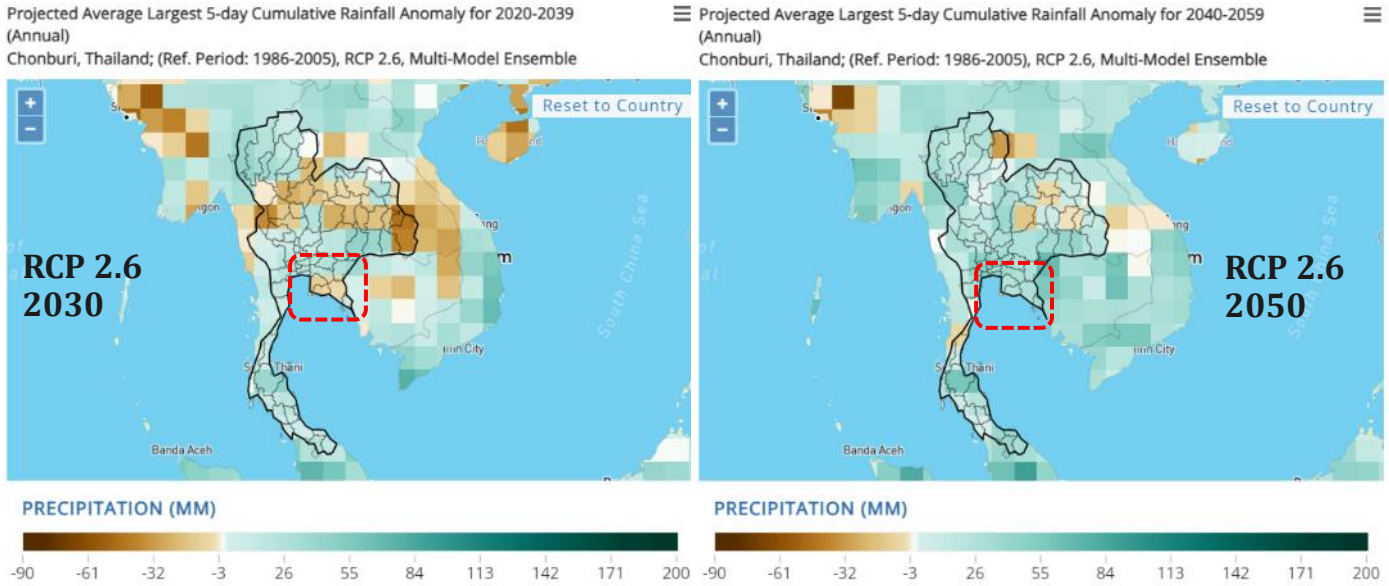
Physical Scenario Analysis

Qualitative Assessment: Flood

Thailand: Projection of Consecutive Heavy Rain

https://climateknowledgeportal.worldbank.org/



The heavy rain may increase and decrease in some areas in 2030 but increase in most areas towards 2050

Impacts on business	Examples of risks
• **Damage to corporate assets** e.g., company inventory, vehicles, fixtures, and fittings, and valuable machinery. These instruments can be damaged and the loss is beyond repair cost. • **Severe flooding possibly disrupts** agriculture transportation as a valuable part of the supply chain.	• **The 2011 floods in Thailand** is a powerful example. It caused **$ 45 billion US dollars in damages** and Thailand GDP shrunk by 10%. The supply chain disruption of the floods was felt around the world: more than 800 companies affected.

Risk Score Color Key			
Higher Risk	Mod. Risk	Lower Risk	Limited

Baseline

No.	Asset	Riverine Flood	Urban Flood
1	Rayong: GC Operations		
2	Chonburi: GC Operation		
3	Samutprakan: Customer		
4	Samutsakorn: Customer		

RCP 2.6

No.	Asset	Riverine Flood		Urban Flood	
		2030	2050	2030	2050
1	Rayong: GC Operations				
2	Chonburi: GC Operation				
3	Samutprakan: Customer				
4	Samutsakorn: Customer				

RCP 8.5

No.	Asset	Riverine Flood		Urban Flood	
		2030	2050	2030	2050
1	Rayong: GC Operations				
2	Chonburi: GC Operation				
3	Samutprakan: Customer				
4	Samutsakorn: Customer				

Strategy

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Transition Scenario Analysis (Overview)

Transitioning to a lower-carbon economy may entail extensive changes to the business structure which is required to address mitigation and adaptation requirements related to climate change. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of business impacts to companies. Transition risks can be categorized into policy and legal, technology, market, and reputational risks.

To identify the drivers that are most significant to GC, we conducted an initial screening of all relevant transition drivers (Annex 3). From all the transition drivers included in the screening process, we selected one risk (carbon price) and one opportunity (biofuel demand) to further explore in this year's assessment.

Driver	TCFD Category	Driver Description	Rationale for Selection
Carbon price	Policy and Legal	The projection of carbon pricing under restrictions from future carbon policies.	As GC's businesses (Base Chemical, Derivatives & Bio-Chemicals, and Performance Chemicals) are energy-intensive, future implementations of carbon pricing mechanisms will directly impact GC's operating costs and consequently, revenue.
Biofuel Demand	Market	The demand for low-carbon products, including biofuels, is expected to increase as consumers are seeking to decarbonize and meet GHG reduction targets.	GC has targets to expand the Bio and Circularity segment of our operations by 35% by 2030.

In 2023, we have updated our transition risk assessment by conducting both qualitative and quantitative analyses to understand the impacts of selected drivers under the IEA Stated Policies (STEPS) and IEA Net Zero Emissions by 2050 (NZE 2050) scenarios.

Scenarios	Description	Temperature Alignment	Maintain at 2.0 C by 2050
STEPS	Nationally Determined Contributions under the Paris Agreement, but much more besides. In practice, the bottom-up modelling effort in this scenario requires a lot of detail at the sectoral level, including pricing policies, efficiency standards and schemes, electrification programs as well as specific infrastructure projects.	Base case 2.6 °C in 2100	Not Possible
NZE 2050	A pathway for the global energy sector to achieve net zero CO_2 emissions by 2050, with advanced economies reaching net zero emissions in advance of others. The uptake of all the available technologies and emissions reduction options is dictated by costs, technology maturity, policy preferences, and market and country conditions.	1.5 °C in 2100	Possible

Strategy

the effects of those climate-related risks and opportunities on the entity's strategy and decision-making

Transition Scenario Analysis

Qualitative Assessment: Heatmap

The heatmap represents the risk and opportunity associated with each driver in 2030 and 2050 timeframes and indicates the location of climate-related risks and opportunities for GC. As the STEPS scenario represents a 'business-as-usual' scenario that is expected to occur under current climate policies and action, a comparison between STEPS and NZE 2050 provides an indication of the risks and opportunities that may occur during the transition towards a low-carbon economy.

Identified Transition Risk & Opportunity	GC	
Drivers	2030	2050
Carbon price		
Biofuel Demand		

Risk/Opportunity Score Color Key						
Higher Risk	Mod. Risk	Lower Risk	Limited	Lower Opp.	Mod. Opp	Higher Opp

Carbon Price

In 2030, there are moderate risks that can impact GC's business from the implementation of a carbon tax mechanism. By 2050, the impacts expected by 2030 will increase and become more significant.

Biofuel Demand

In 2030, the demand for biofuels presents a moderate opportunity in the medium-term but will gradually diminish in the long-term as traditional fossil fuels are phased out while the energy mix becomes more reliant on clean energy sources. The use of bioenergy (including biofuels) is expected to become standard. Therefore, the opportunity in the long-term will decrease.

Strategy

the effects of those climate-related risks and opportunities on the entity's strategy and decision-making

GC's Climate Strategy

Based on the assessment results from the scenario analysis, it's evident that the climate-related risks and opportunities identified has potential to impact the company's financial performance. The scenario study serves as a tool to understand potential impacts arising from transition of low-carbon businesses. As a result, our downstream & green products businesses remain the most resilient. We've adopted and improved its business practices to promote a transition to a low-carbon businesses, e.g., restructuring our business model, maximizing assets utilization, optimizing resource allocation to effectively deal with the climate-related risks, and capturing the climate-related opportunities.

GC implements measures to mitigate climate change impacts and enhance resilience, crucial for achieving our Net Zero target. We've developed context-specific mitigation and adaptation strategies, considering worst-case scenarios for maximum impact. The direction of our mitigation and adaptation measures revolve around 4 key areas including: development of the climate change plan, investments in advanced technologies to enhance process efficiency, alternative energy utilization, and setting an internal carbon price.

Our **Net Zero Pathway** responds to the scenario consideration that embrace 3 pillars:

- **Efficiency-Driven**: Enhancing process efficiency and shifting to renewable or low-carbon energy as well as developing and implementing low carbon emitting technologies.
- **Portfolio-Driven**: Implementing projects that have been ranked by their investment priority to reflect the company's current situation and are in line with the low-carbon business strategy.
- **Compensation-Driven**: Offsetting carbon to manage residual greenhouse gas from production processes and business operations by studying and implementing the Carbon Capture Utilization and Storage (CCUS) technology, and nature-based solutions.

Strategy

the effects of those climate-related risks and opportunities on the entity's strategy and decision-making

GC's Climate Strategy

Efficiency-driven

- Applied energy reduction technology to cut down carbon emissions in production processes and switched to renewable or low-carbon energy.
- Attained the ISO 50001:2018 Energy Management System certification
- Developed innovative projects related to efficiency enhancement, e.g., Stripper Column Optimization and Advance Membrane Separation Technology to Streamline Separation Efficiency in Production Process

Portfolio-driven

- Aim to expand long-term adjusted EBITDA in Specialty Chemicals to 30 percent and in Bio and Circularity businesses to 7 percent of all product groups, by 2030
- Invested in bio-based raw materials, bioplastic, and recycled materials through the technology and innovation that support the production of bio-based products, bioplastics, recycled plastics, including high value businesses (HVB), which consist of high-performance specialty chemicals.

Compensation-driven

- Manage residual greenhouse gas after having executed Efficiency-driven and Portfolio-driven operations by employing technology, such as Carbon Capture and Storage (CCS), and nature-based solutions, such as reforestation, forest restoration and carbon credit trading, etc., to enable an economic transformation process.

Scope 3 Reduction

- Fuels to Chemicals
- Value Chain Management e.g.,
  - GC establishes a vendor's decarbonization roadmap creation program focusing on supporting the suppliers to develop their decarbonization roadmap, including assisting an assessment of supplier's readiness.

Source: GC ISR 2023

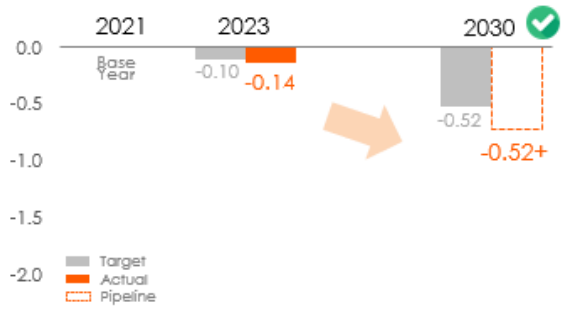
Strategy

the effects of those climate-related risks and opportunities on the entity's strategy and decision-making

Net Zero Pathway Update

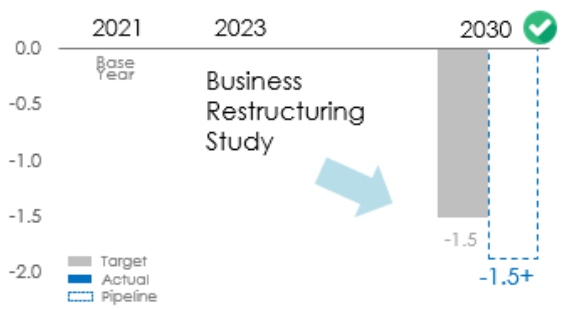
Efficiency-driven

Emission reduction (MtCO2e)



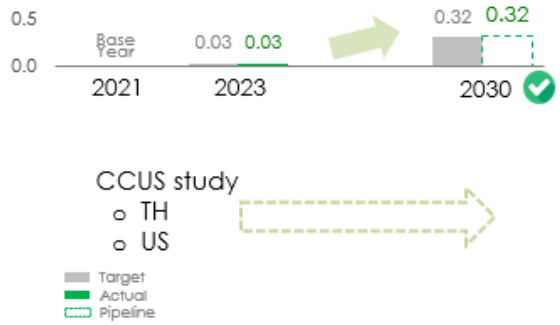
Portfolio-driven

Emission reduction (MtCO2e)



Compensation-driven

Carbon Credit Inventory (MtCO2e)



2023 Highlights:

~138 $ktCO_2e$ GHG reduction in 2023 (projects since 2022-23)

- **>190 Projects implemented**
  - Optimization / process & equipment upgrade
- **>9,800 MWh replaced by RE**

~630 $ktCO_2e$ GHG avoidance per year — allnex, ENVICCO

~22 kton Plastic waste managed — GC Youtheru, ENVICCO, UP TO YOU

~27 $ktCO_2e$ Carbon credit inventory from forestation pipeline

- Mangrove
- Terrestrial

2 MOUs CCUS co-development projects in Thailand

Other projects in progress

- NH3 Decomposition / H2 Fuel switching
- Membrane Separation
- Biogas utilization

- Business restructuring study
- New business venturing & CVC
- Sustainable product solutions

- CCU technology development
- Carbon credit management

Source: Analyst Meeting YE/2023 | PTT Global Chemical (pttgcgroup.com)

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Physical Risk Impacts

Risk/Opportunity Score Color Key						
Higher Risk	Mod. Risk	Lower Risk	Limited	Lower Opp.	Mod. Opp	Higher Opp

Identified Risk	Example of Risk Implication	Financial Impacts on GC Business*	Time Horizon
Drought	• Drought may result in unavailability of adequate fresh water both in quantity and quality. This may lead to disruption of production, utilities and/or the personnel. • Drought stress may increase the water sourcing cost, and may require the Plants to rely on more expensive alternate technologies such as desalination. • Drought in the neighbouring communities may lead to shared water challenges, resulting in impact on the communities' perception towards the Plants	Assumption of drought in 2 months period **Water Quantity** • If the water reduction in quantity approx. 30% of GC total water consumption, then no significant impact. • If the water reduction approx. 40% of GC total water consumption may result in: - Plants shutdown leading to shading and financial loss 254 million THB* - Plants slowdown leading to shading and financial loss 150 million THB* Total impact = 404 million THB • If the water reduction approx. 50% of GC total water consumption may result in: - Plants shutdown leading to shading and financial loss 387 million THB* - Plants slowdown leading to shading and financial loss 149 million THB* Total impact = 536 million THB **Water Quality** • Also, when water stress in quantity occurs, the water quality usually is not proper to utilize directly in the operation and its treatment cost will be increased in term of additional chemical and electricity cost. The estimated cost impact is 10.5 million THB. • No impact on PTT GSPs (GC's critical 1st tier feedstock supplier) • No significant impact on GC customers	• Short-term: • Medium-term: • Long-term:

**Note: Depend on business economic*

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Physical Risk Impacts

Risk/Opportunity Score Color Key						
Higher Risk	Mod. Risk	Lower Risk	Limited	Lower Opp.	Mod. Opp	Higher Opp

Identified Risk	Example of Risk Implication	Financial Impacts on GC Business*	Time Horizon
Flood	• Inundation of assets, utilities, infrastructures, facilities and increased land erosion • Disruption/damage of infrastructure and movement of personnel and goods • Loss of property value • Personnel and infrastructure safety • Increase of asset insurance cost	Assumption of (water depth 1.5 m for 1 day) • Plant disruption 1 day resulted in revenue loss 0.53 million USD or 16.7 million THB. The calculation is based on the average revenue during Jan-May in the previous year) • Financial implication = revenue loss = 16.7 million THB	• Short-term: • Medium-term: • Long-term:
		• GC's critical 1st tier feedstock supplier may delay delivery raw material but there is no significant impact to GC.	
		• There are 2 major customers and no significant impact on GC business	

**Note: Depend on business economic*

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Physical Risk Management Measures and Adaptation Plan

Identified Risk	Management Measures and Adaptation Plan	Investment / Cost of Response
Drought	**Own Operation** GC launches the tangible water management practices within GC Group to ensure long-term sustainability of water supply, including water consumption plans based on 3Rs principle (Reduce, Reuse, Recycle) and increase in production capacity of the Wastewater Reverse Osmosis (WWRO) system. It also includes the plans to produce fresh water instead of withdrawal fresh water from natural sources, as measures and adaptation plan as follows. **Internal management:** • Installation Mobile Sea Water Reverse Osmosis (SWRO) at Refinery • Installation of pipeline system and projects around wastewater recycling • Improvements to other water related infrastructure, such as Wastewater Reverse Osmosis(WWRO), investment • Secured resource contract (higher price, increase OPEX ~8 MB/year at Refinery) **External management:** • Collaboration with PTT group to actively engage other key stakeholders to participate in Water War Room Rayong. • Collaboration with others in Map Ta Put Plant Manager Club* • Collaboration with neighbor communities to conserve watershed areas • Collaboration with Eastern Economic Corridor (EEC) for feasibility study of large capacity SWRO (200,000 liter/day) production. • There is also a possibility of external investor to invest for SWRO production. *Note that Map Ta Put Plant Manager Club (MTP PMC) comprised of many company in Map Ta Put industrial estate, RIL industrial estate, WHA industrial estate, Pa Deang industrial estate, Asia industrial estate, IRPC group and Map Ta Put Port Operating Companies. The objective of MTP PMC is to be the group for communication, support and exchange information. For example, the situation of water and mitigation plan for both and flood situation.	**300 million THB** This measure and adaptation cost of response are implemented presently (less than 5 years), as well as covering both existing and new operations (100% coverage).

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Physical Risk Management Measures and Adaptation Plan

Identified Risk	Management Measures and Adaptation Plan	Investment / Cost of Response
Flood	**Own Operation** **Internal management (Prevention):** • Sewer system survey and maintenance before raining season. • Site monitoring during heavy raining. • Study to build hard wall (applied historical flooding data about 2 times of historical raining rate 130 mm.) • Further design plant basis including historical peak raining rate. **Mitigation:** Sandbag and mobile pumps **External management:** • GC collaborates with PTT group to actively engage other key stakeholders to participate in Water War Room Rayong • Collaboration with others in Map TaPut Plant Manager Club • Collaboration with neighbor communities to conserve watershed areas	**20 million THB** This measure and adaptation cost of response is implemented presently (less than 5 years) , as well as covering both existing and new operations (100% coverage).
Drought and Flood	**Supply Chain** GC conducts water risk assessments (using tools such as Environmental Impact Assessment and Life Cycle Assessment) to identify relevant suppliers with high water-related risks, which are found to be PTT Gas Separation Plant, GPSC, and GLOW. As GC is the leader of PTT Group Water Management Team, we have developed knowledge-sharing sessions for suppliers and PTTEP group to synergize water consumptions and reduction goals that is external water management, water reduction application, and water discharge regulations. This synergy (which includes, engagement with the suppliers and training sessions, reporting, and disclosure of suppliers' water consumption) is then focused on the high-risk ranking group. Additionally, GC prepares mitigation actions and shredding ranking guidelines to minimize water consumption by 10-70% to alleviate impacts on business. These actions will be conducted internally and externally along the supply chain with the support of the management team.	This engagement cost is included in operational cost. This measure and adaptation cost of response is implemented presently (less than 5 years) , as well as covering both existing and new operations (100% coverage).

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Transition Risk Impacts

Risk/Opportunity Score Color Key						
Higher Risk	Mod. Risk	Lower Risk	Limited	Lower Opp.	Mod. Opp	Higher Opp

<table>
<tr><th>Identified Risk</th><th>Possible Risk Implication</th><th>Financial Impacts of Transition Risk on GC Business*</th><th>Time Horizon</th></tr>
<tr>
<td>Carbon price</td>
<td>
• Increased capital investment in upgrading facilities or transition
• Increased operating costs due to policy changes, such as compliance costs or insurance premiums
• Reduced profitability due to higher costs
</td>
<td>
GC included climate change regulations as one of GC's corporate risk factor in the corporate risk assessment process conducted by the Enterprise Risk Management Committee. The additional costs arising from the implementation of carbon pricing regulations may be significant given GC's operations are energy intensive. We have quantified the potential financial implications that may affect GC as follows:
<table>
<tr><th></th><th>STEPS</th><th>NZE</th><th>Difference</th></tr>
<tr><td colspan="4">2030 (medium-term)</td></tr>
<tr><td>Carbon Tax Cost (million THB)</td><td>15,838</td><td>30,457</td><td>14,619</td></tr>
<tr><td>Impact on Net Profit (%)</td><td>-26%</td><td>-50%</td><td>-24%</td></tr>
<tr><td colspan="4">2050 (long-term)</td></tr>
<tr><td>Carbon Tax Cost (million THB)</td><td>32,622</td><td>110,791</td><td>78,169</td></tr>
<tr><td>Impact on Net Profit (%)</td><td>-18%</td><td>-61%</td><td>-43%</td></tr>
</table>
As there are currently no carbon pricing regulations or carbon tax mechanisms in Thailand, there are no immediate impacts. We expect the implementation of a carbon tax mechanism starting in 2030.
</td>
<td>
• Short-term:
• Medium-term:
• Long-term:
</td>
</tr>
</table>

**Note: Depend on business economic*

Strategy

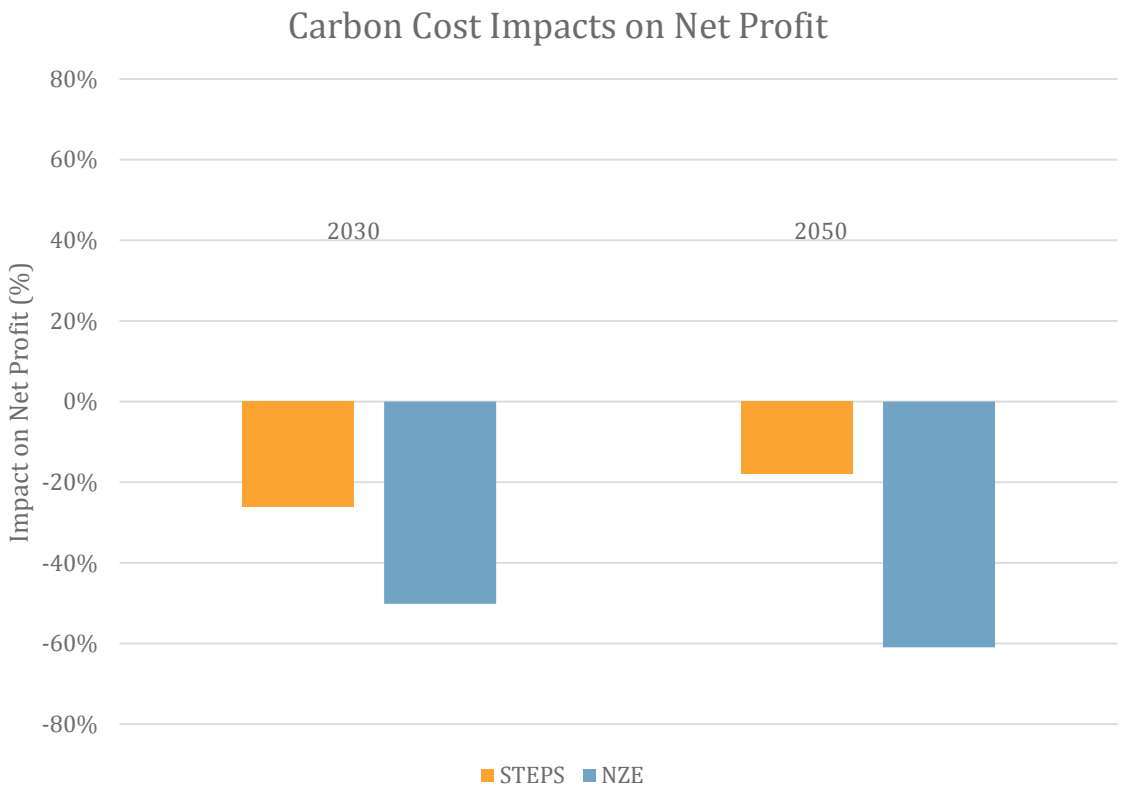
the effects of those climate-related risks and opportunities on the entity's financial performance

Transition Scenario Analysis

Driver	2030	2050
Carbon price		

Risk/Opportunity Score Color Key						
Higher Risk	Mod. Risk	Lower Risk	Limited	Lower Opp.	Mod. Opp	Higher Opp

Semi-quantitative Assessment – Risk: Carbon Price



The difference in the financial implications from the implementation of a carbon tax mechanism between STEPS and NZE 2050 was -24% in 2030 and -43% in 2050. The financial implications was calculated by applying the projected carbon costs from the IEA under the STEPS and NZE 2050 scenarios on GC's projected GHG emissions under a business-as-usual (base case) scenario to obtain carbon tax costs. The carbon tax costs was assessed against net profit to determine its impact on GC's profitability.

Results Interpretation

- In 2030, the impacts from the implementation of a carbon tax mechanism on GC's net profit is greater in NZE compared to STEPS
- In 2050, the impacts from the implementation of a carbon tax mechanism on GC's net profit in both scenarios are further increased with the greatest impacts expected in 2050 under the NZE scenario

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Transition Opportunity Impacts

Risk/Opportunity Score Color Key						
Higher Risk	Mod. Risk	Lower Risk	Limited	Lower Opp.	Mod. Opp	Higher Opp

Identified Opportunity	Possible Implication	Financial Impacts on GC Business*	Time Horizon
Green Products (Biofuel Demand)	• Increase the competitive capacity in the market • Reduced operating costs due to avoided carbon price/fee under the carbon related policy, such as compliance costs • Increased long-term revenues (all green products including biofuels)	Clean energy sources, including biofuels, are crucial resources in the transition towards a low-carbon economy by enabling large emissions reductions. Therefore, GC plans to increase investments in the development of green products and sustainability-driven solutions. **The initial financial opportunity from green products is at least approximately 87 billion THB per year** (the impacts will be increased in the future as GC set the growth rate at +4% EBITDA per year). In the short-term, we identified **biofuels** as one of the green products that have the potential for growth. Therefore, we have quantified the potential financial opportunity arising from the changing market demands for biofuel as follows:	• Short-term: • Medium-term: • Long-term:

	STEPS	NZE	Difference
2030 (medium-term)			
Revenue* (million THB)	17,916	18,489	573
Impact on Revenue (%)	4%	8%	4%
2050 (long-term)			
Revenue* (million THB)	18,270	17,639	631
Impact on Revenue (%)	1%	-2%	-3%
* Remark: Only includes revenue from Methyl Ester			

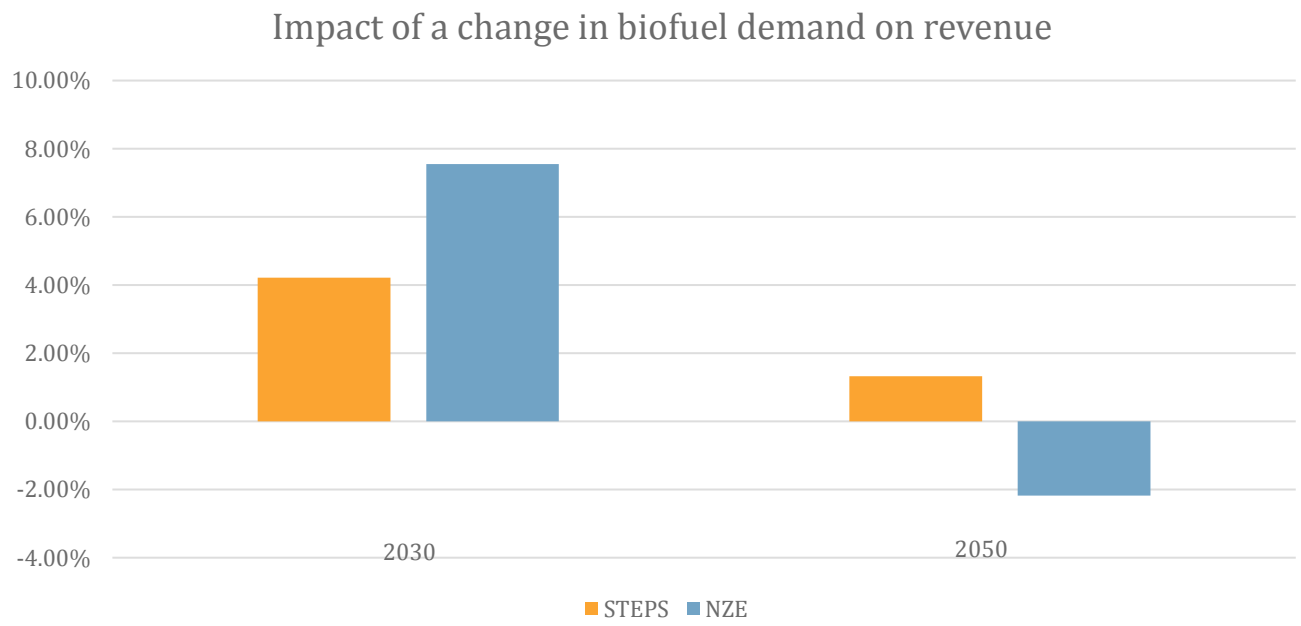
Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Transition Scenario Analysis

Semi-quantitative Assessment – Opportunity: Biofuel Demand

The financial implications from changes in biofuel demand (indicated by consumption) was identified as an opportunity arising from the transition towards a low-carbon economy. The difference in the potential opportunity quantified between STEPS and NZE was 4% in 2030 and -3% in 2050. This figure was calculated by projecting GC's production of biofuels based on the year-on-year percentage change in liquid bioenergy consumption which was used as an indicator of demand. To quantify the associated financial implication that may arise from this opportunity, the revenue from the forecasted production of biofuels under each of the two scenarios was estimated.



Driver	2030	2050
Biofuel Demand		

Results Interpretation

- In 2030, there are some opportunities from biofuel, as reflected by growth in revenue, in both STEPS and NZE. The opportunity in NZE is greater than in STEPS
- In 2050, there are still some opportunities from biofuel in STEPS as the world is still transitioning towards a low-carbon economy. However, in NZE, biofuels are no longer an opportunity as new technologies that are more effective may become available thus decreasing the consumption and demand of biofuels.

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Net Zero Transition Plan

Identified Risk	Management Plan	Investment / Cost of Response

Carbon Price	GC has been conducting business with consideration of risks caused by climate change. Thus, GC has committed to strive to achieve the Net Zero target by 2050.
	
	GC focus on managing resources to achieve efficiency and sustainability based on Circular Economy. GC also implements technology in our operations in tandem with promoting stakeholder engagement. To mitigate these risks, GC has been conducting Decarbonization Pathways for approaches to reduce carbon emissions to reach the Net Zero goal by implementing business activities in three approaches which include Efficiency-Driven, Portfolio-Driven, and Compensation-Driven.
		945 billion THB
		
		Estimated investment during 2021 – 2050
		• $5 billion or 175 billion THB: GHG emission reduction
		  • Efficiency-driven: investment in technology for energy efficiency improvement and low carbon power and heat/renewable.
		  • Compensation-driven: invest in nature-based solutions and carbon capture and storage
		• $22 billion or 770 billion THB: Business portfolio evolution towards low carbon business
		  • Portfolio-driven: Green products (e.g. bio-fuels and bio plastics) and recycled and upcycled products.
		
		Part of:
		• **Efficiency-driven**
		• **Portfolio-driven**
		• **Compensation-driven** 

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Net Zero Transition Plan

Identified Opportunity	Management Measures/Adaptation Plan	Investment / Cost of Response

Biofuel Demand	Additionally, GC is well aware of the lower demand and price of fossil fuels due to the renewable energy trend and increasing demand for recycled and bio-based products. Therefore, GC plans to seize this opportunity by transforming its business portfolio to reflect a low-carbon business and increase investments in the development of low-carbon products, sustainability-driven solutions, and technologies that provide sustainability value-added to users. These bio-products include biofuels, bioplastics, recycled products, high-performance products, low-carbon products, and upcycled products. Below are the measures GC has put in place:
	• Invest in low-carbon process technology
	• Invest in capacity for green products such as bio-fuel, bio plastic
	• Invest in recycled products, high-performance product, low carbon products, upcycled products
		770 billion THB (2021 – 2050)
		or
		24.5 billion THB per year
		
		Estimated investment during 2021 – 2050
		
		• Total investment is $22 billion or 770 billion THB: Business portfolio evolution towards low carbon business
		  • Green products such as bio-fuel, bio plastic
		  • Recycled and upcycled products
		
		Part of:
		• **Portfolio-driven**

Strategy

the effects of those climate-related risks and opportunities on the entity's financial performance

Summary of climate-related risks and opportunities impact on business, strategy, and financial planning

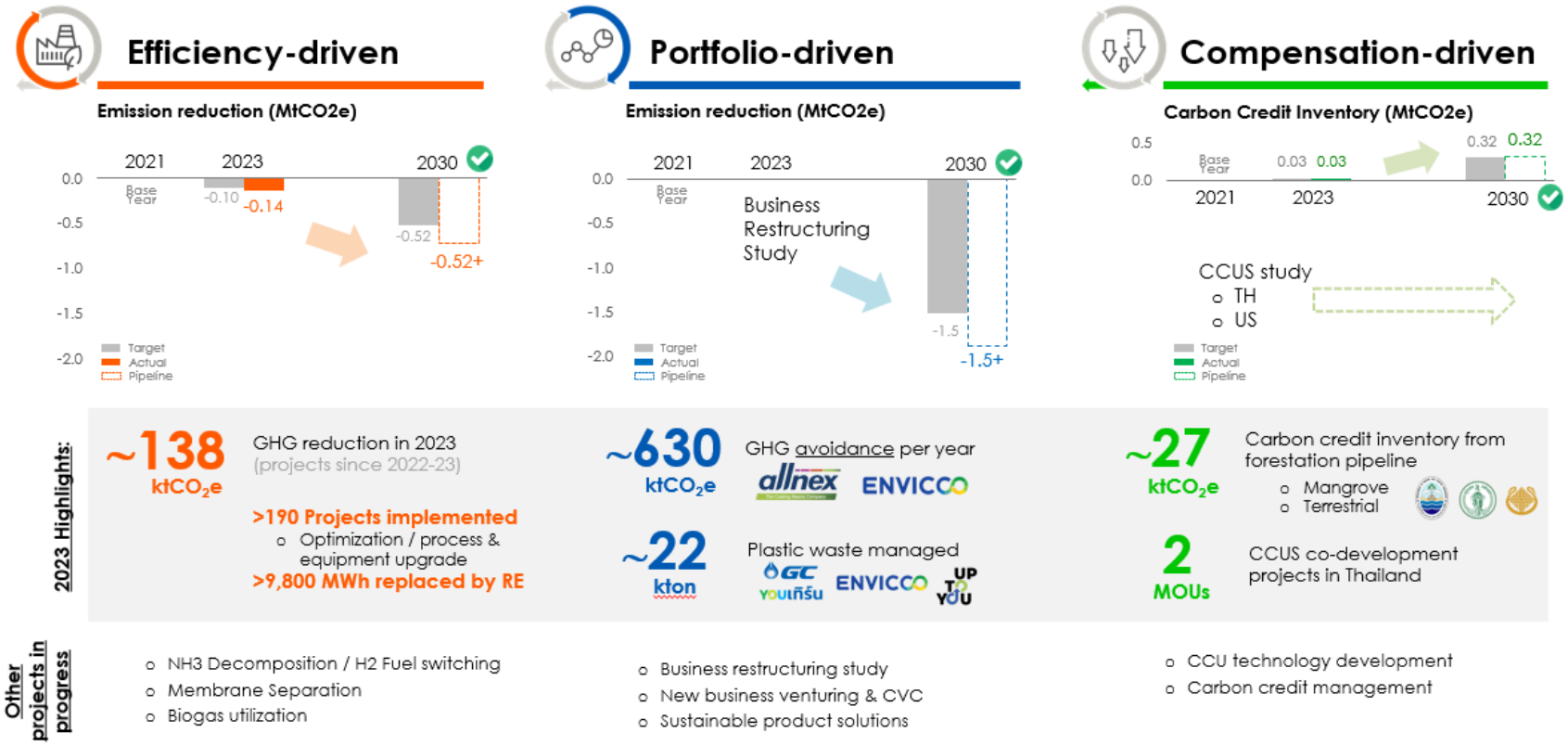
Risk/ Opportunity	Physical Risk			Transition Risk	Transition Opportunity
Driver	 Drought	 Flood	 Extreme Events	 Carbon Price	 Biofuel Demand
Impact of Identified Risks to GC Business	Drought may result in the unavailability of adequate freshwater. This may lead to disruption of production and utilities. Additionally, it may also increase the water sourcing cost as the plant requires to adopt more expensive alternate technologies.	Disruption of GC's operation resulted in revenue loss. GC's critical 1st tier feedstock supplier may delay delivery raw material but there is no significant impact to GC.	GC's design standard with a design margin of 10% can cope with maximum wind speed in Thailand. No significant impact on GC assets.	As GC's businesses are energy-intensive, the implementation of a carbon tax/price mechanism will have significant impacts on GC's overall profitability.	Increase in demand for low carbon products and bioenergy (including biofuels) driven by the need for emissions reductions presents an opportunity for business growth.
Expected Impacts Timeframe	• Long-term (2031-2050)	• Medium-term (2024-2030) • Long-term (2031-2050)	• Medium-term (2024-2030) • Long-term (2031-2050)	• Medium-term (2024-2030) • Long-term (2031-2050)	• Short-term (base case - 2022) • Medium-term (2024-2030) • Long-term (2031-2050)
Financial Implication	546.5 MTHB	16.7 MTHB*	-	110,791 MTHB	87,000 MTHB per year

*Estimated minimum financial impact for both medium- and long-terms

Strategy

the climate resilience of the entity's strategy and its business model to climate-related changes

GC has devised a net-zero pathway consisting of three key approaches: efficiency-driven, portfolio-driven, and compensation-driven, to effectively address climate-related risks and opportunities. The company develops transition plans and resilience strategies by continuously assessing any uncertainties including market conditions, regulations, consumer trends, and potential opportunities. This approach ensures that GC remains adaptive and proactive in navigating climate challenges while capitalizing on emerging opportunities.



Source: Analyst Meeting YE/2023 | PTT Global Chemical (pttgcgroup.com)

Example of the other investment to prepare the resilience of business:

- GC Ventures invests in UK-based start-up **Interface Polymers**, a developer of high-performance additives for performance plastics to enhance recyclability properties
  - This investment strengthens GC's and allnex's position in performance polymers and plastics circularity by potential to simplify the processing and reusability of widely used mixed plastics.
  - Interface Polymers is a developer of innovative chemical additives to improve the recyclability and performance properties of key polymers.
- **allnex** had implemented several projects such as China Hub project to prepare for the business expansion for growth in China and ASIA. Furthermore, there were innovation development projects with GC to enhance its business competitiveness in the future. Overall, allnex could maintain its profitability, EBITDA, and profit per unit at the comparable level as other major players in the markets
- **Vencorex** was implementing production cost reduction plans to increase revenue and enhance competitiveness

Source:
- GC Ventures invests in UK-based start-up Interface Polymers
- AGM 2024 (pttgcgroup.com)

Strategy

the climate resilience of the entity's strategy and its business model to climate-related changes

Summary of Climate-related Scenarios Analysis that were Applied

The scenario analysis is a crucial tool for companies to develop effective climate resilience plans in response to identified risks and opportunities. At GC, we have employed robust, internationally-recognized information and tools to craft climate-related scenarios that are both reliable and meaningful. These scenarios consider key assumptions, such as the impact of climate-related policies, macroeconomic trends, local weather patterns, demographics, land use, infrastructure, energy usage, and availability of natural resources. We draw upon publicly available sources to inform these assessments. The scenario analysis was carried out in 2022.

Risks/Opps	Drought	Flood	Extreme Weather	Carbon Price	Biofuel Demands
Climate Types	Physical Risk	Physical Risk	Physical Risk	Transition Risk	Transition Opportunity
Scenario	RCP 2.6, 4.5, 8.5	RCP 2.6, 4.5, 8.5	RCP 2.6, 4.5, 8.5	STEPS, NZE2050	STEPS, NZE2050
Timeframe	2030-2050	2030-2050	2030-2050	2030-2050	2030-2050
Impacted areas from the assessment	• Rayong • Chonburi • Samut Prakan • Samut Sakhon	• Rayong • Chonburi • Samut Prakan • Samut Sakhon	• Rayong • Chonburi • Samut Prakan • Samut Sakhon	• Rayong • Chonburi • Samut Prakan • Samut Sakhon	• Rayong • Chonburi • Samut Prakan • Samut Sakhon
Sources (Tools)	• Aqueduct • Climate Explorer	• Aqueduct • Climate Explorer	• Aqueduct • Climate Explorer • Research papers	• IEA scenario • Internal Carbon Price	• IEA scenario • Business financial model

According to above, GC's assessment holds significant implications for its strategy and business model, particularly as it pertains to responding to climate-related risks and opportunities. With a portfolio shift towards low-carbon businesses, GC has strategically aligned its operations and investments with this transition. This entails adapting its business model to capitalize on emerging opportunities in renewable energy, sustainable technology, and eco-friendly products. This proactive approach ensures the company remains resilient and well-positioned in a rapidly evolving climate-conscious market

Note: For more detail of scenario analysis, please see in *"Strategy: (b) the current and anticipated effects of those climate-related risks and opportunities on the entity's business model and value chain."* (slides no. 15-19)

1. IFRS S2 Framework
2. Governance
3. Strategy
4. Risk Management
5. Metrics and Targets

Risk Management

the processes uses to identify, assess, prioritise and monitor climate-related risks

Process for Identifying and Assessing Climate-related Risks

1. Identification Process

Functions:

Heads of Business Units (BU), Heads of Support Functions (SF)

Processes:

Identification and assessment of climate-related risks and opportunities across GC assets through the consideration of situations, and developing the climate-related scenarios by inputting the GC's key operational locations and applying internationally-recognized information e.g., likelihoods and magnitude of effect of potential impacts.

A Risk Coordinator (RC) in each unit will aggregate the risks from the dedicated Risk Owners in the SFs and BUs: Climate-related risks are identified (and assessed) in different departments: Technology and innovation, Strategy, Markets/Business, Legal, Investor relations, and stakeholders expectation.

2. Assessment Process

Functions:

Enterprise Risk Management Coordinator

Processes:

Risks and opportunities assessments are conducted **on a yearly basis** in order to forecast and budget the process. All risks and opportunities are analyzed.

Risks and opportunities that deviate from set targets and planned/forecast EBITDA or net income above 2% would be considered substantive and are further assessed. All opportunities and risks are then analyzed and prioritized by the Enterprise Risk Management Coordinator. Risk mitigation and adaptation measures are developed and implemented as necessary.

GC's scenario analyses of climate-related risks and opportunities (separate from the traditional risks and opportunities assessment outlined above) has been conducted in response to climate-related opportunity of the shift towards a low-carbon economy.

3.1 Process Applied to Physical Risks

Functions:

Risk-related units and departments, Business and Support Function Units at asset level

Processes:

The physical risks and opportunities from natural disasters are monitored and managed continuously. Risks and opportunities are communicated to the Risk Coordinators monthly.

3.2 Process Applied to Transition Risks/Opportunities

Functions:

Enterprise Risk Management Committee (ERMC), Management Committee (MC), Risks Management Committee (RMC)

Processes:

The RMC is responsible for the establishment of the policy and risk management framework as well as monitoring and providing recommendations on the implementation of the risk management framework.

Risks that are associated with corporate strategy (e.g. legal and market risks) are brought to the attention of the ERMC on a monthly basis, then the MC (chaired by the CEO), before being brought to the RMC for acknowledgment or approval on a quarterly basis.

Risk Management

the processes uses to identify, assess, prioritise and monitor climate-related risks

Process for Managing Climate-related Risks

GC established an Enterprise Risk Management framework according to the international standard of the Committee of Sponsoring Organizations of the Treadway Commission (COSO), the International Organization for Standardization's ISO 31000.

- The objective of the risk management framework and guidelines that GC has established is to systematically manage risks associated with climate change throughout the organization.
- This management scheme is also integrated into GC's policies, rules, and standards related to governance, risk management, internal control, and compliance, to incorporate climate-related risk management into GC's internal management so as to protect and create sustainable value for the organization. Such initiatives are extended to GC's subsidiaries and suppliers through conducting executive workshops and communicating with employees to build a risk management culture.

GC continuously promotes a risk management culture throughout the organization to ensure stable and sustainable growth. GC develops a risk culture guideline and enforces it throughout the organization. There are six components, which are Risk Governance, Leadership, Risk Structure, Risk Technique, Risk Communication, and Risk Management Knowledge.

Risk Management

the processes uses to identify, assess, prioritise and monitor climate-related opportunities

Process for Identifying and Assessing Climate-related Opportunities

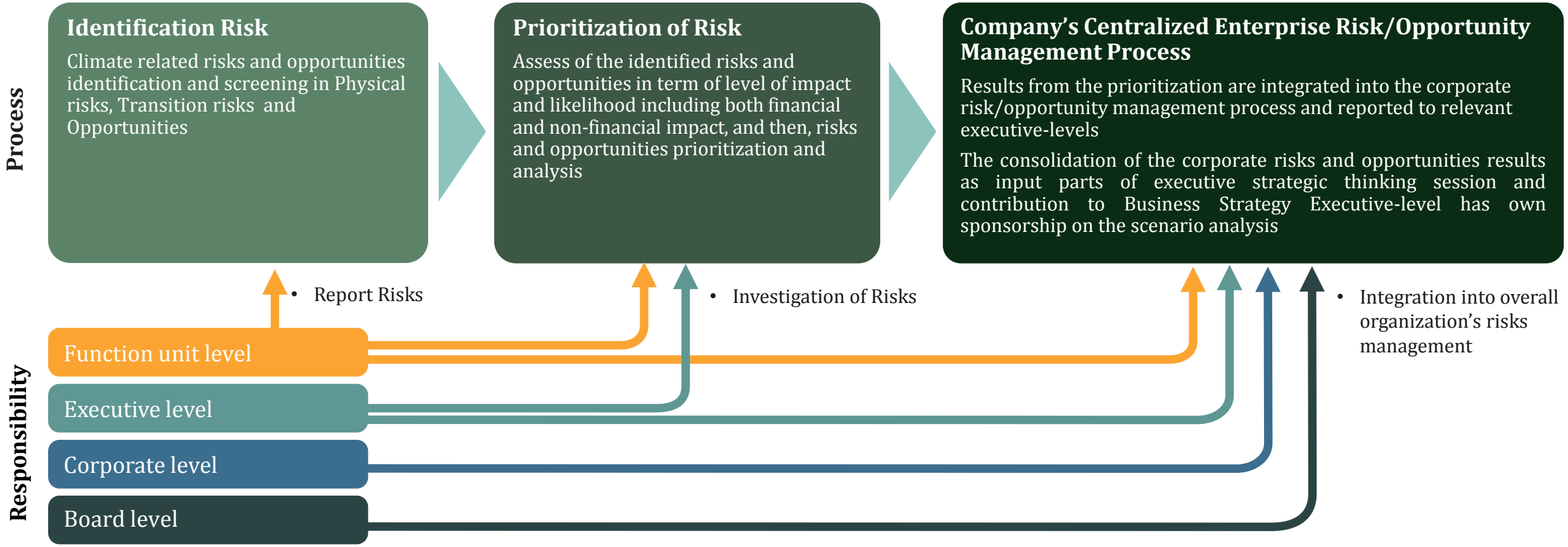
GC's comprehensive scenario analyses extend beyond traditional risk assessments to specifically address climate-related opportunities. In response to the shift towards a low-carbon economy, these analyses meticulously examine potential avenues for growth and innovation.

By identifying emerging trends, market dynamics, and technological advancements, GC aims to strategically position itself within the evolving landscape of sustainable business opportunities. Through this proactive approach, the company seeks to capitalize on the transition towards low-carbon solutions, further enhancing its competitiveness and long-term sustainability.

Risk Management

the processes of identifying, assessing, prioritising and monitoring climate-related risks and opportunities are integrated into and inform the entity's overall risk management process.

Integration of Process for Identifying, Assessing, and Managing Climate-related Risks and Opportunities in Company-wide Risk Management Process



Risk Management

the processes of identifying, assessing, prioritising and monitoring climate-related risks and opportunities are integrated into and inform the entity's overall risk management process.

Integration of Climate Change Risks & Opportunities in Company-Wide Risk Management

GC has analyzed various internal and external risk factors that may occur in its business operations, both in the short-term and long-term. This includes the importance of emerging risk factors that may cause a significant impact on the company and/or industry during the next 3-5 years from the Early Warning System, to determine energy management strategies and climate change. Guided by the TCFD with a climate change action plan, GC is investing in cutting-edge technology to increase production efficiency and use renewable energy. In addition, GC has determined its own internal carbon price. In this analysis, financial loss or gain above 2% of EBITDA is considered as a substantial financial impact. However, this value is not only used during prioritization. Considering the combination of the magnitude of this financial impact with the probability of the event occurring, scenarios with low financial impact, but high probability might also be classified as high-risk scenarios.

GC has clearly defined policies, targets, and key performance indicators (KPIs) to reduce greenhouse gas emissions within its organization for the short-term, medium-term, and long-term. These are in line with efforts to reduce the impacts of international climate change around the world, such as Thailand's Greenhouse Gas Reduction Goals (NDCs), targets under the Paris Agreement from the 21st session of the United Nations Convention on Climate Change (COP21), the United Nations Sustainable Development Goals 7 and 13 (UN SDGs), the CDP and the Community Alignment Programmed, along with consumer influence on the supply chain, to move towards responsibility for product development according to circular economy principles.

If global carbon emissions are not effectively controlled, climate volatility will occur, in the form of droughts, floods, and an increase in the frequency and intensity of storms. In addition, rising sea levels and increasing heat waves can pose a significant risk to GC's businesses and the value chain of GC's business partners. GC has prepared various measures to mitigate and cope with such impacts

1. IFRS S2 Framework
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4. Risk Management
5. Metrics and Targets

Metrics and Targets

Climate-related Metrics

GHG Emissions

Data performance period from 1st January to 31st December 2023
The total GHG emissions by scope within GC organizational boundary are as follows:

Emission Scopes (as defined within ISO 14064-1:2006)	GHG Emissions (million tons CO_2 equivalent)			
	2020	2021	2022	2023
Direct GHG Emissions (scope 1)	5.79	6.52	6.14	6.13
Market-based energy indirect (scope 2)*	1.78	2.03	2.04	1.83
Location based energy indirect (scope 2)*	1.97	2.06	2.04	1.81
Other relevant indirect GHG emission (scope 3)**	38.45	37.25	35.36	41.49

Remark:
* GC has purchased the energy from grid, covering 7.95% of total energy consumption within the organization.
** GHG scope 3 covers 9 categories, including Purchased goods and service, Capital goods, Upstream transportation and distribution, Waste generated in operations, Business travel, Downstream transportation and distribution, Processing of sold products, Use of sold product and End-of-life treatment of sold product.

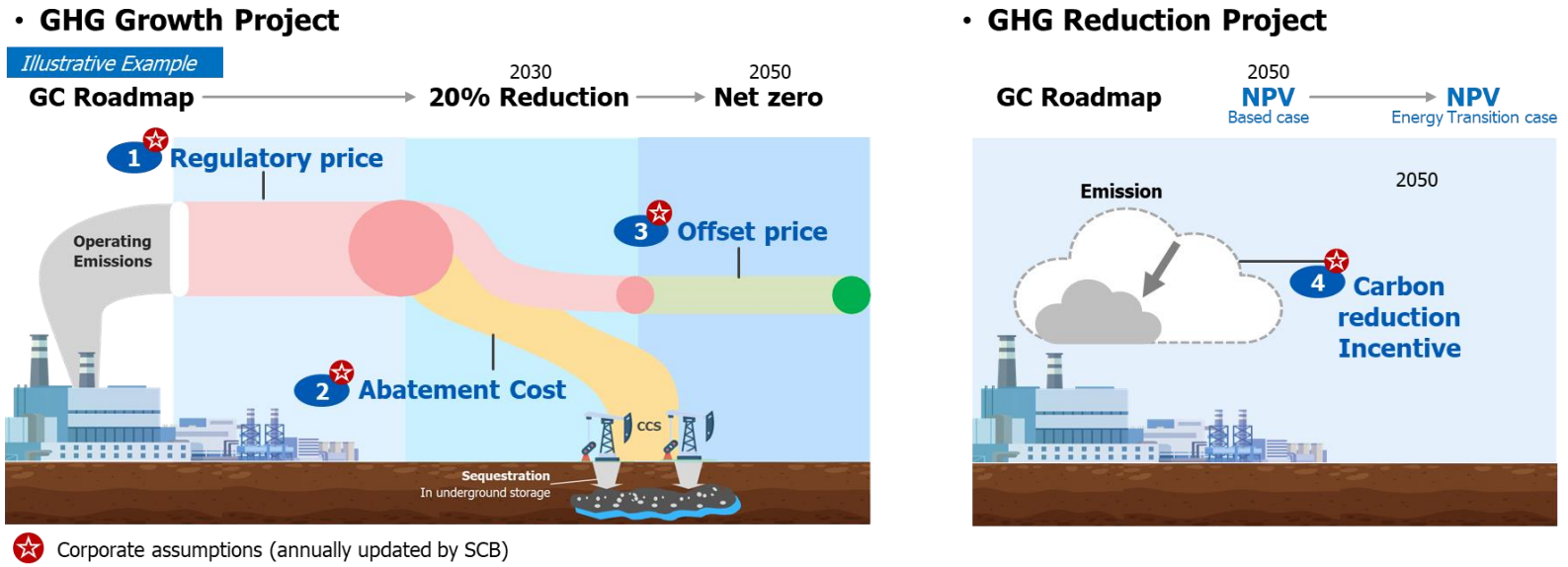
Methodologies and Standards

1. American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry, 2009
2. IPCC Guidelines for National Greenhouse Gas Inventories, 2006
3. ISO 14064-1
4. Thailand Greenhouse Gas Management Organization: The National Guideline Carbon Footprint for organization
5. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

Metrics and Targets

Climate-related Metrics

Internal Carbon Prices



Internal carbon pricing serves as a strategic tool in evaluating new assets for decarbonization initiatives. GC applies the internal carbon pricing principles into business decision-making, it guides the selection of projects aligned with the decarbonization roadmap, by assigning a monetary value to carbon emissions that could identify cost-effective emission reduction opportunities. This approach ensures that capital investments consider environmental impact, fostering sustainability while maximizing economic value. Currently, the value of carbon is set at 14 -113 USD per tCO2e.

In addition, GC has applied internal carbon prices to assess the Marginal Abatement Costs Curve (MACC) from various projects to compare the cost-effectiveness of operations in reducing carbon.

Metrics and Targets

Climate-related Metrics

Climate-related Remuneration

CEO, executive, and employee compensation is contingent upon performance against established Corporate Key Performance Indicators (KPIs). As part of our Operational Excellence Benchmarking, GC aligns Corporate KPIs with our Energy & Climate Strategy, particularly focusing on Energy Efficiency, including energy and GHG emissions reduction. Performance is evaluated across five levels, with compensation and bonuses distributed to relevant executives and employees meeting KPIs at level 3 or above.

GHG emission targets have been set as a Corporate KPI since 2021, with GHG reduction targets integrated into performance reviews for executives and employees. The remuneration of achieving set GHG emissions target covered 5% of total remuneration metrics, on average. Monetary rewards are tied to individual KPI achievement, with bonuses awarded based on meeting base or stretched targets, relative to company performance.

Climate-related Risk Vulnerability and Opportunity Alignment

GC has thoroughly considered and assessed the financial impact of both physical and transition risks, including climate-related opportunities across its entire business portfolio. The business is organized into five core groups: Upstream, Intermediates, Polymers and Chemicals, Bio and Circularity, and Performance Chemicals.

According to the assessment, physical risks, such as extreme weather conditions (e.g., droughts, floods), could potentially impact all operations in Thailand. Similarly, transition risks, primarily associated with determining carbon pricing mechanisms, are significant for all business activities linked to carbon emissions. As a result, 100% of GC's business activities are deemed vulnerable to both physical and transition risks.

Regarding climate opportunities, GC has identified biofuel demand as a growth opportunity. Activities contributing to biofuel development fall under the Bio and Circularity group, which constitutes approximately 2-4% of GC's total business activities.

Metrics and Targets

Climate-related Metrics

Climate-related disclosure topics & metrics (Volume 47: Chemicals)

Topic	Code	Metric	Performance at fiscal year
Greenhouse Gas Emissions	RT-CH-110a.1	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulation	6.13 million tons (12.40% of total GHG emissions)
	RT-CH-110a.2	Discussion of long- and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Achieved short-term ghg emission target, on progress of pursuing net zero target.
Energy Management	RT-CH-130a.1	(1) Total energy consumed (2) percentage grid electricity (3) percentage renewable (4) total self-generated energy	(1) 39,301,804 MWh (2) 7.95% (3) 0.02% (4) 21,016,940 MWh
Water Management	RT-CH-140a.1	(1) Total water withdrawn (2) total water consumed; percentage of each in regions with High or Extremely High Baseline Water Stress	(1) 67.740 million m3 (2) 45.62 million m3 (0%)
	RT-CH-140a.2	Number of incidents of non-compliance associated with water quality permits, standards and regulations	0
	RT-CH-140a.3	Description of water management risks and discussion of strategies and practices to mitigate those risks	Regularly monitoring the water situation
Product Design for Use-phase Efficiency	RT-CH-410a.1	Revenue from products designed for use-phase resource efficiency	n/a THB

Disclosure reference: IFRS-S2-IBG – Issued IFRS Standards

Metrics and Targets

Climate-related Targets

Climate Strategy	Climate Strategy
Reduce GHG emissions (scope 1 and 2) 20% by 2030 (based year 2021)	Achieve net-zero emissions (scope 1 and 2) by 2050 and reduce GHG emissions by 50% for scope 3 by 2050.

GC has established climate targets to guide the direction of its business operations towards reducing greenhouse gas (GHG) emissions. These targets encompass 100% of GC's own operations and are aligned with national and global goals, such as Thailand's Nationally Determined Contribution (NDC), the Paris Agreement from COP26, and the Sustainable Development Goals (SDGs).

To ensure alignment with these targets, GC diligently monitors and evaluates its climate-related performance, particularly GHG emissions. Governance bodies at both board and management levels oversee and investigate performance, ensuring adherence to the developed climate transition roadmap. These bodies receive quarterly updates on climate-related progress to stay informed and proactive in addressing climate challenges.

GHG Emissions Performance against the defined target

	Unit	2021	2022	2023	Target 2023
GHG Emissions* for scope 1&2	million tons CO_2e	8.55	8.18	7.96	8.57
GHG Emissions intensity for scope 1&2	tCO_2e per ton production	0.41	0.41	0.37	-

Target 2030

20%

Reduction of GHG emissions from base year (2021)

Remark:
* The GHG emissions selection and calculation has been conducted based on Kyoto Protocol that includes Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF6).

Based on the aforementioned performance, although there was a slight increase in absolute GHG emissions in FY2023 compared to FY2022, this can be attributed to GC's expansion of business operations and subsequent increase in production volume. Despite this, GC remains on course to achieve its near-term target of a 20% reduction by 2030.

Metrics and Targets

Climate-related Targets

Carbon Credits

GC is actively involved in carbon credit initiatives as part of its decarbonization efforts. We create carbon credits to offset greenhouse gas emissions from operations by employing various technologies and nature-based solutions e.g., carbon capture and storage (CCS) technology, reforestation and forest restoration to sequester carbon.

GC is also working on researching Carbon Capture Utilization and Storage (CCUS) technology and collaborating within PTT Group, including other leading companies and institutions, to scale up carbon capture efforts, aiming for million tonnes of carbon capture with CCUS technology by 2050. We have been engaged in multiple projects such as Huai Mahad Reforestation, Water Conservation Project, Mangrove Forestation, Forestation over Garbage Disposal Area, Forestation at GC Chemical Experience, the Rayong Wanarom Ecological Forest Project, etc., to restore forest ecosystems for carbon sequestration. These projects have potential outcomes to generate carbon credit 12,000 – 20,000 tCO2/year.

Additionally, GC also aimed to plan, promote, explore, develop, invest in projects, cooperate, research, acquire knowledge, science, and technology, and conduct businesses related to carbon dioxide emission reduction or other greenhouse gases, products derived from or in connection with them, as well as rights arising from reducing the emissions into the environment in various forms such as carbon credits to support the company's target.

Source: 20230421-pttgc-agm2023-minutes-en.pdf (pttgcgroup.com)
Compensation-Driven | PTT Global Chemical (pttgcgroup.com)

Annex 1:
Global Standard on Responsible Climate Lobbying

Responsible Climate Lobbying

PTT Global Chemical Public Company Limited or GC is committed to participate and engage responsibly through our contributions as we grow our business by balancing our impact on Thailand's economy, society, and environment. To help achieve this, we contribute to national and international associations that support industries and the country in improving economic, environmental, and social dimensions for sustainable growth.

GC contributes to associations and organizations to help them in their mission of creating and supporting public policies and regulations. These associations and organizations assist policymakers by sharing information from external sources, research, and visions regarding sustainable growth for Thailand, different industries, health and safety, reducing environmental impact, and implementing the United Nations Sustainable Development Goals (SDGs).

GC, in support of the Paris Agreement, aims to achieve net zero emissions by 2050 by driving our decarbonization pathway through three pillars: efficiency-driven, portfolio-driven, and compensation-driven. To ensure that our contributions support the delivery of Thailand's NDC and the Paris Agreement, GC has established effective governance and oversight processes. GC's management system for contribution is in place and aligned with the UNGC's Guide for Responsible Corporate Engagement in Climate Policy.

Policy and Commitment

No.	Framework Indicator	GC Actions
1	Make a public commitment to align all of its climate change lobbying with the goal of restricting global temperature rise to 1.5^0C above pre-industrial levels	GC commits to conduct all climate change-related activities, including climate lobbying, in alignment to Thailand's NDC and the Paris Agreement. GC also commits to achieve Net Zero emissions by 2050 with the goal of restricting global temperature rise to 1.5^0C above pre-industrial levels. Our net zero commitments have been communicated internally and externally and is also included in our 'Quality, Security, Safety, Occupational Health, Environment and Business Continuity (QSHEB) Policy'.
2	Apply the scope of this commitment to all of its subsidiaries and business areas, and all operational jurisdictions	GC's climate-related policies and climate strategy is applicable to all of GC's subsidiaries, jurisdictions, and business areas.
3	Publicly commit to taking steps to ensure that the associations, alliances and coalitions of which it is a member conduct their climate change lobbying in line with the goal of restricting global temperature rise to 1.5^0C above pre-industrial levels	GC contributes to associations and organizations to help them in their mission of creating and supporting public policies and regulations. These associations and organizations assist policymakers by sharing information from external sources, research, and visions regarding sustainable growth for Thailand, different industries, health and safety, reducing environmental impact, and implementing the United Nations Sustainable Development Goals (SDGs). The activities of the associations and organizations support the achievement of Thailand's NDC and the Paris Agreement.

Governance (1)

No.	Framework Indicator	GC Actions
4	Assign responsibility at board level for oversight of its climate change lobbying approach and activities	The Corporate Governance and Sustainability Committee (CGS) oversees the Management Committee (MC) which provides progress and updates from the Sustainability Development Committee (SDC). The CGS monitors and oversees progress against goals and targets for addressing climate-related issues. Approval for climate-related actions, including climate change lobbying, is also determined by the CGS. Therefore, the CGS is accountable for reviewing and implementing the management system for climate change-related lobbying activities and trade association memberships.
5	Assign responsibility at senior management level for day-to-day implementation of its climate change lobbying policies and practices	At the management level, the SDC was established to govern the strategic directions for the mitigation of climate change-related issues. One of SDC's responsibilities is to ensure that measures, policies, and strategies for the organization and its partners are aligned. This includes ensuring all climate change lobbying policies and practices that GC engages in must also reflect GC's overall visions and net zero ambition. SDC also reports the progress and implementation results to the MC and Group Management Committee (GMC). The final summarization will be reported to the CGS to oversee and provide recommendations for the next steps.
6	Establish an annual monitoring and review process to ensure that all of its direct and indirect climate change lobbying activities across all geographies are consistent with the goal of restricting global temperature rise to 1.5^0C above pre-industrial levels	GC conducts a quarterly monitoring and review process to assess whether public policy engagements and lobbying are aligned with the Paris Agreement for all direct lobbying activities and trade associations we are involved in. Internally, GC's climate lobbying activities must be approved by the board where a review process is conducted to ensure that all direct and indirect activities across all geographies are consistent with Thailand's NDC and Paris Agreement. Externally, within each trade association and organization that GC contributes to, GC is involved in the development of a monitoring and evaluation system which is focused on ensuring that the activities of these trade associations and organizations are consistent with Thailand's NDC and the Paris Agreement.

Governance (2)

No.	Framework Indicator	GC Actions
7	Establish a process for engaging with stakeholders related to setting and reviewing its climate change lobbying policies, positions and activities	GC regularly engages with our stakeholders involved in climate-related policies and activities including our suppliers, customers, government representatives as well as industry peers and trade association and organization members to review our climate change-related policies, positions, and activities. GC works closely with government institutions as a part of the working team including being a part of the Climate Change steering committee of the Federation of Thai Industries (F.T.I), being a part of the Ministry of Foreign Affairs, Kingdom of Thailand, and a part of the Ministry of Finance. These institutions continuously perform programs related to engaging with stakeholders to support them in comprehending expectations from financial institutions, including customer trends, on climate change that will lead to setting and understanding of climate change lobbying positions and activities.
8	Establish a clear framework for addressing misalignments between the climate change lobbying positions adopted by the associations, alliances and coalitions of which it is a member and the goal of restricting global temperature rise to 1.5^0C above pre-industrial levels	Through regular engagements and review of the trade association or organization's activities with other members, GC ensures that the organizational objectives amongst trade association and organization members as well as the objectives of the trade association or organization are aligned with Thailand's NDC and the Paris Agreement. We have a clear framework for addressing misalignments in place. If misalignments are identified, discrepancies are addressed through extensive discussions and engagements with involved parties. Moreover, GC will reconsider and reassess its position in the trade association or organization and may distance the company from the misalignment if necessary to ensure alignment to Thailand's NDC and the Paris Agreement.

Action

No.	Framework Indicator	GC Actions
9	Publish a detailed annual review covering the company's assessment and actions related to the 1.5^{0}C-alignment of: (a) its own climate change lobbying activities; (b) the climate change lobbying activities of the associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support	GC regularly reviews climate change lobbying activities, at least on an annual basis, to ensure that alignment to Thailand's NDC and the Paris Agreement. As part of the review process, GC engages with stakeholders and trade association and organization members to monitor policies and activities. Results of the review indicated that there were no misalignments between the climate lobbying activities conducted by the trade associations and Thailand's NDC or the Paris Agreement. All of GC's climate change-related actions, including climate lobbying, is approved by the board through the CGS.
10	Recognise the existence of and report on action to address any misalignments between its climate change lobbying and/or the climate change lobbying activities of its trade associations, coalitions, alliances or funded thinktanks and the goal of limiting global temperature rise to 1.5 ^{0}C above pre-industrial levels	GC has not identified any misalignments between our climate change lobbying and/or the climate change lobbying activities of the trade associations and Thailand's NDC or the Paris Agreement.
11	Create or participate in coalitions that have the specific purpose of lobbying in support of the goal of restricting global temperature rise to 1.5^{0}C above pre-industrial levels	GC proactively participated in discussions on environmental and climate change policies with the government to promote projects and initiatives that support Thailand's low carbon economy transition in line with Thailand's NDC and the Paris Agreement such as discussions to drive the Bio-Circular-Green Economy model which focuses on resource efficiency and circularity in the biochemicals sector. Notably, GC is also involved in The Joint Standing Committee on Commerce, Industry, and Banking, a partnership between The Federation of Thai Industries, The Thai Chamber of Commerce, and The Thai Bankers' Association, which develops and proposes ESG frameworks and policies to promote a sustainable economy. Looking forward, GC will continue to seek opportunities in the participation of coalitions that support and are aligned to Thailand's NDC and the Paris Agreement.

Specific Disclosures (1)

No.	Framework Indicator	GC Actions
12	Publicly disclose, for all geographies, its membership of, support for and involvement in all associations, alliances and coalitions engaged in climate change-related lobbying	GC engages in climate change-related lobbying through our membership, support, and involvement in the following trade associations which covers 2 main issues: **1. Responsible business operations, especially in sustainability and climate change.** • Petroleum Institute of Thailand (PTIT) • The Federation of Thai Industries (F.T.I) • Thailand Business Council for Sustainable Development (TBCSD) • Thai Bioplastics Industry Association GC's vision ourselves in becoming a sector global leader in responsible business operation and raw material consumption. As part of this objective, GC commits to support and expedite public movement and operations to resolve and mitigate negative impacts arising from climate change. Therefore, spending incentives on trades of associations will support GC's commitment to achieving the Net Zero target. Moreover, the circular economy principle has also been applied to business operations, accompanied by responsible resource consumption and environmental awareness. **2. Support the development of sustainable petroleum and petrochemical industries** • Petroleum Institute of Thailand (PTIT) • The Federation of Thai Industries (F.T.I) • Oil industry Environmental Safety Group Association (IESG) • Thai Bioplastics Industry Association The primary objective of these groups is to focus on the advancement and enhancement of sustainable development for all industries, with their focus on the petroleum and petrochemical industries. Such activity includes but is not limited to, establishing sustainable and appropriate national policies, introducing emerging technologies that can minimize environmental and social impacts during operation, and encouraging occupation and community health and safety.

For more information: https://sustainability.pttgcgroup.com/en/economy/organization-contributions

Specific Disclosures (2)

<table>
<tr><th>No.</th><th>Framework Indicator</th><th>GC Actions</th></tr>
<tr><td>13</td><td>Publicly disclose, for each of these organisations: (a) how much it pays to them on an annual basis; (b) those organisations where it sits on the board or plays an active role in committees or other activities related to climate change</td><td>
Contributions to Each Organization
<table>
<tr><th>Trade Association</th><th>Contributions 2023 - THB</th></tr>
<tr><td>The Federation of Thai Industries</td><td>370,220</td></tr>
<tr><td>Oil Industry Environmental Safety Group Association</td><td>813,000.00</td></tr>
<tr><td>Thai National Shipper’s Council</td><td>26,750</td></tr>
<tr><td>Community Partnership Association</td><td>126,000</td></tr>
<tr><td>Thailand Business Council for Sustainable Development</td><td>250,000</td></tr>
<tr><td>Thai Bioplastics Industry Association</td><td>10,000</td></tr>
</table>
Active role in Committees or Activities related to Climate Change
Mr. Kongkrapan Intarajang sits in GC’s board of directors as the executive director and sits in the TCNN’s Council Board. The TCNN aims to promote cooperation between the government, private sector, and local sectors/communities in enhancing GHG reductions to achieve the goals of the Paris Agreement.
</td></tr>
</table>

Specific Disclosures (3)

No.	Framework Indicator	GC Actions
14	Publicly disclose its overall assessment of the influence that its climate lobbying has had on (a) supporting ambitious public climate change policy; (b) the company's ability to deliver its own corporate transition strategy	GC supports ambitious public climate change policy through our contributions to trade associations and organizations that align with Thailand's NDC and the Paris Agreement. These contributions are in line with GC's ambitions to achieve net zero emissions by 2050 which supports the goal of restricting global temperature rise to 1.5^{0}C above pre-industrial levels. GC's contributions support two main issues including (1) Responsible business operations, especially in sustainability and climate change and (2) Support a development of sustainable petroleum and petrochemical industries By supporting projects and initiatives, through our climate lobbying activities, that contribute to Thailand's low carbon economy transition in line with Thailand's NDC and Paris Agreement, GC influences the development of sectoral and national climate-related policies and initiatives. In the long-term, this supports and enables GC to drive our own corporate transition strategy which aims to achieve net zero emissions by 2050.

Annex 2:
Physical Scenario Analysis

SUPPLEMENTARY MATERIALS

Physical Scenario Analysis

Driver Context

Change of precipitation patterns leading to drought and flood (chronic)

Climate change and its potential effects from precipitation patterns change may lead to drought and water shortage or prone to increase flooding in some areas. Without an efficient water management and flooding prevention plan, GC's business operations may be affected and disrupted. For drought, GC Thailand (>90% operation sites) uses water from reservoirs not from river basins which are the same water sources for municipal use. Water shortage in the production process or deteriorating raw water quality leads to production process disruption, which may decrease GC's revenue and increasing procedures for implementation of new measures and laws, e.g. permission request, water allocation, legal responsibility, etc.

Increased severity of extreme weather (acute)

Climate patterns in longer-term shifts is one of the basic characteristics of climate change. Increasing number of storms, cyclones may cause disruptions of crude transportation by sea freight. That climate change risk could potentially effects GC's supply chain stability, if alternative methods are not thoroughly planned. GC production site at Rayong is running with the crude from West Africa and North America, mostly. Any disruptions of crude transportation in Indian ocean may cause the delay of feedstocks delivery.

GC takes this water availability into short and long-term risk management. GC has accounted for potential negative impacts from droughts in two main scenarios: 1) Low case scenario where water in reservoirs reaches a low level with no additional water from other sources, and 2) Moderate case scenario based on historical data where there is a low water level in reservoirs.

Drought and Flood Assessment Methodology

AQUEDUCT THE CLIMATE EXPLORER

ScienceDirect ELSEVIER

SPI	Flood Impact
2.00 and above	Very high
1.50 to 1.99	High
1.00 to 1.49	Medium
0.00 to 0.99	Low

Likelihood	Flood Impact
Very High risk = >2 severe drought/flood year within 10 years	Very high
High risk = 2 severe drought/flood year within 10 years	High
Medium risk = 1 severe drought/flood within 10 years	Medium
Low risk = No severe drought or flood year with in 10 years	Low

SPI	Drought Impact
- 2.00 and less	Very high
-1.50 to -1.99	High
-1.00 to -1.49	Medium
0.00 to -0.99	Low

SPI – Standard Precipitation Index

Category	SPI	Probability (%)
Extremely wet	2.00 and above	2.3
Severely wet	1.50–1.99	4.4
Moderately wet	1.00–1.49	9.2
Near normal	−0.99–0.99	68.2
Moderate drought	−1.00 to −1.49	9.2
Severe drought	−1.50 to −1.99	4.4
Extreme drought	−2.00 and less	2.3

Physical Scenario Analysis

Qualitative Assessment Results

Legend

	- No Hazard		- Low Hazard		- Medium Hazard		- High Hazard

Baseline

Sr. No.	Asset	Water Stress	Riverine Flood	Landslide Precipitation	Extreme Heat	Wind Speed (Average)	Wind Speed (Maximum)	Cyclone	Coastal Flood
1	Rayong: GC Operation and Supplier	2	2	0	2	1	3	0	0
2	Chonburi: GC Operation	1	0	0	2	1	3	0	0
3	Bangkok: GC Head Office	2	2	0	3	1	3	0	0
4	Samut Sakhon Client 1	2	2	0	3	1	3	0	3
5	Samut Prakan Client 2 MMS	2	2	0	3	1	3	0	2

RCP 2.6

Sr. No.	Asset	Water Stress			Riverine Flood[1]			Landslide Precipitation			Extreme Heat			Wind Speed (Average)[2]			Wind Speed (Maximum)[2]			Cyclone[3]			Coastal Flood		
		BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050
1	Rayong: GC Operation and Supplier	2	2	2	2	2	3	0	0	0	2	3	3	1	1	1	3	3	3	0	1	1	0	0	0
2	Chonburi: GC Operation	1	1	1	0	0	0	0	0	0	2	3	3	1	1	1	3	3	3	0	1	1	0	0	0
3	Bangkok: GC Head Office	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	0	0	0
4	Samut Sakhon Client 1	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	3	3	3
5	Samut Prakan Client 2 MMS	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	2	2	2

RCP 4.5

Sr. No.	Asset	Water Stress			Riverine Flood[1]			Landslide Precipitation			Extreme Heat			Wind Speed (Average)[2]			Wind Speed (Maximum)[2]			Cyclone[3]			Coastal Flood		
		BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050
1	Rayong: GC Operation and Supplier	2	2	2	2	3	2	0	0	0	2	3	3	1	1	1	3	3	3	0	1	1	0	0	0
2	Chonburi: GC Operation	1	1	1	0	0	0	0	0	0	2	3	3	1	1	1	3	3	3	0	1	1	0	0	0
3	Bangkok: GC Head Office	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	0	0	0
4	Samut Sakhon Client 1	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	3	3	3
5	Samut Prakan Client 2 MMS	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	2	2	2

RCP 8.5

Sr. No.	Asset	Water Stress			Riverine Flood[1]			Landslide Precipitation			Extreme Heat			Wind Speed (Average)[2]			Wind Speed (Maximum)[2]			Cyclone[3]			Coastal Flood		
		BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050	BSL	2030	2050
1	Rayong: GC Operation and Supplier	2	2	2	2	3	3	0	0	0	2	3	3	1	1	1	3	3	3	0	1	1	0	0	0
2	Chonburi: GC Operation	1	1	1	0	0	0	0	0	0	2	3	3	1	1	1	3	3	3	0	1	1	0	0	0
3	Bangkok: GC Head Office	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	0	0	0
4	Samut Sakhon Client 1	2	2	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	3	3	3
5	Samut Prakan Client 2 MMS	2	3	2	2	2	3	0	0	0	3	3	3	1	1	1	3	3	3	0	1	1	2	2	3

Annex 3:
Transition Scenario Analysis

SUPPLEMENTARY MATERIALS

Transition Scenario Analysis

Drivers Screening

Policy and legal

GC as an energy- and the emissions-intensive company is directly affected by current and emerging regulations targeting energy use and efficiency as well as reduction of emissions. Emerging regulation Thailand starts the process of developing the foundations for a national carbon price using World Bank funds, a climate official said, a process which will culminate in a mandatory emissions trading scheme. There is some possibility that Thailand could issues new Thailand acts related to climate change in the near future.

Technology

Decarbonization technologies including Carbon Capture and Storage (CCS), fossil fuel switching to hydrogen fuel and other alternative energy that can threaten the corporates if they have not prepare and plan to mitigate the impact. These technologies can support GHG reduction target in 2050 alignment with national and international targets but Installation of equipment or improvement of production process to reduce GHG emissions may result in higher operating cost. GC included climate change related technology as one of GC's corporate risk factor in corporate risk assessment process by Enterprise Risk Management Committee.

Market and Reputation

At present, environmental awareness and demanding changing of circular economy has become a growing trend at both national and international levels. Thai and Asian consumers have, thus, become more aware of long-term environmental impacts, leading to a decline in single-use plastic consumption and an increase in purchase of products made from renewable raw materials or recycled plastic. Decrease in single-use plastic consumption and growing trend to modify the components of environmentally friendly products by entrepreneurs have lowered the demand for plastic pellets in the period of two to three years, affecting GC's revenue directly. Another emerging of EV (Electricity Vehicle) demanding increase also is able to have an impact on GC's refinery business. Public concerns of single-use plastic ban are coming together with low-carbon economy and increase demand of EV increase due to renewable energy trend. GC Thailand as a leading petrochemical company in South East Asia cannot avoid public expectations on moving forward to low-carbon economy. If we fail to convince that GC is following an emission reduction pathway towards low-carbon industry we will experience difficulties to retain young shareholders.

Transition Scenario Analysis

Drivers Screening

To ensure that the transition scenario analysis is reflective of GC's businesses, we conducted a screening process of all transition drivers identified as relevant to GC. In line with TCFD recommendations, the drivers identified covers policy and legal, technology, market, and reputational risks.

Transition Drivers	TCFD Category	Brief Description
Nationally Determined Contributions (NDC)	Policy & Legal Risk (Current regulation)	Thailand's NDC commitment aims to achieve carbon neutrality by 2050 and net zero emissions by 2065. Therefore, although not enforced, we are expected to contribute towards meeting national targets.
Carbon tax	Policy & Legal (Emerging regulation)	The projection of carbon pricing under restrictions from future carbon policies.
Exposure to climate-related litigation	Policy & Legal (Legal risk)	Increased awareness of climate change drives enforcement and increase scrutiny on climate-related issues from government agencies and the public sector resulting in increased risks of litigation.
Carbon Capture Utilization and Storage (CCUS)	Technology	CCUS presents an opportunity to reduce significant amounts of GHG emissions. However, they also require high investments and delayed deployment will impact GC's ability to meet GHG emissions targets.
Switching to electricity as an energy source	Market	The demand for electric vehicles (EV) and recycled plastic products are expected to increase. The growth in demand for fossil-based fuels is expected to slow down.
Demand for biofuels	Market	As companies and sectors decarbonize, biofuel demand will continuously increase due to their contributions towards meeting GHG reduction targets.
Demand for recycled plastic products	Market	Consumers have become increasingly aware of the environmental impacts from their consumption of products. Therefore, recycled plastics or products that are produced from recycled plastics will increase.
Hydrogen use	Market	Hydrogen as a potential clean energy source
Stakeholder Perceptions	Reputational	External stakeholder pressure to have clear disclosures on climate-related activities, governance, and strategy.

= Selected drivers for further study in this year's Transition Scenario Analysis.

Annex 4:
IFRS S2 Content Index

IFRS S2 Content Index

Pillar	Guidance	Source
Governance	(a)the governance body(s) (which can include a board, committee or equivalent body charged with governance) or individual(s) responsible for oversight of climate-related risks and opportunities. Specifically, the entity shall identify that body(s) or individual(s) and disclose information about:	P. 6-9
	(b) management's role in the governance processes, controls and procedures used to monitor, manage and oversee climate-related risks and opportunities, including information about:	P. 10-11
Strategy	(a) the climate-related risks and opportunities that could reasonably be expected to affect the entity's prospects.	P. 12-13
	(b) the current and anticipated effects of those climate-related risks and opportunities on the entity's business model and value chain;	P. 14
	(c) the effects of those climate-related risks and opportunities on the entity's strategy and decision-making, including information about its climate-related transition plan	P. 15-22
	(d) the effects of those climate-related risks and opportunities on the entity's financial position, financial performance and cash flows for the reporting period, and their anticipated effects on the entity's financial position, financial performance and cash flows over the short, medium and long term, taking into consideration how those climate-related risks and opportunities have been factored into the entity's financial planning	P. 23-33
	(e) the climate resilience of the entity's strategy and its business model to climate-related changes, developments and uncertainties, taking into consideration the entity's identified climate-related risks and opportunities	P. 34-35
Risk Management	(a) the processes and related policies the entity uses to identify, assess, prioritise and monitor climate-related risks, including information about:	P. 37-38
	(b) the processes the entity uses to identify, assess, prioritise and monitor climate-related opportunities, including information about whether and how the entity uses climate-related scenario analysis to inform its identification of climate-related opportunities; and	P. 39
	(c) the extent to which, and how, the processes for identifying, assessing, prioritising and monitoring climate-related risks and opportunities are integrated into and inform the entity's overall risk management process	P. 40-41
Metrics and targets	Climate related metrics	P. 44-47
	Climate-related targets	P. 48-49