International Sustainability Standards Board (ISSB Standards) Report: Sustainability-related Financial Disclosure 2024

PTT Global Chemical Public Company Limited

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30 JULY 2025

This ISSB report of PTT Global Chemical Public Company Limited ("GC") and its subsidiaries are partially prepared in accordance with the IFRS Sustainability Disclosure Standards as issued by the International Sustainability Standards Board (ISSB).

IFRS SUSTAINABILITY STANDARDS:

IFRS S1 *General Requirements for Disclosure of Sustainability-related Financial Information*
IFRS S2 *Climate-related Disclosure*

Contents

	Page
Contents	3
List of Tables	4
List of Figures	5
List of Abbreviations	6
1. Summary of Executive	8
2. Basis of Preparation	12
3. GC's Business Activities and Value Chain	14
4. Reporting Boundary	19
5. Judgements and Measurement Uncertainties	20
6. Materiality Assessment	22
7. Governance	25
8. Strategy	31
9. Risk Management	54
10. Metrics and Targets	57
11. ISSB Index	64

List of Tables

		Page
Table 3-1	GC's value chain, business units, geographical locations and their revenue stream by each business unit	15
Table 5-1	Key areas using significant judgments	20
Table 5-2	Measurement Uncertainty	21
Table 7-1	Roles and Responsibilities of Governing Bodies	26
Table 7-2	Roles and Responsibilities of Management Level	27
Table 7-3	Governing Bodies Skill Matrix	29
Table 7-4	Climate-related Performance in incentive schemes	30
Table 8-1	The effect of climate-related risks and opportunities that could reasonably be expected to affect GC's prospects, business activities, and value chain	32
Table 8-2	The results of physical baseline assessment	36
Table 8-3	Summary of current mitigation and adaptation plans for the year of 2024	38
Table 8-4	Summary of scenarios applied for analyses	40
Table 8-5	The outcome of scenario analyses, potential impacts on GC's strategy and business model, as well as its mitigation and adaptation strategies	42
Table 8-6	Summary of GC's capacity to adjust or adapt its overall strategy and business model to climate change	50
Table 8-7	Financial impacts quantification of climate-related Physical risks and opportunities	52
Table 8-8	Financial impacts quantification of climate-related Transition risks and opportunities	53
Table 9-1	Inputs used for Physical Risk Assessment	54
Table 9-2	Inputs used for Transition Risks and Opportunities	54
Table 10-1	GHG Emissions Performance against the defined target	58
Table 10-2	GHG Emissions by scope within GC in million tons CO2- equivalent	59
Table 10-3	Breakdown GHG emissions scope 3	59
Table 10-4	Performance enhancement projects and their CO2 emissions reduction per year	61
Table 10-5	Energy-related metrics	61
Table 10-6	Water-related metrics	62
Table 10-7	Activity metrics	62
Table 11-1	IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information	64
Table 11-2	IFRS S2 Climate-related Disclosure	71

List of Figures

		Page
Figure 3-1	GC's Value Chain	18
Figure 6-1	GC's Double Materiality Assessment Process	22
Figure 6-2	GC's Double Materiality Results	24
Figure 7-1	GC's Climate Governance Structure	25
Figure 8-1	GC's physical risk exposure in domestic operations	35
Figure 8-2	Climate-related risks and opportunities probability map	37
Figure 8-3	Overview of Efficiency-driven Performance	48
Figure 8-4	Overview of Portfolio-driven Performance	49
Figure 9-1	GC's Risk Matrix	55
Figure 9-2	The Integration of process for identifying, assessing, and managing climate-related risks and opportunities into Enterprise Risk Management (ERM) process	56
Figure 10-1	GC's total GHG Emissions (Million Ton CO2e)	60

List of Abbreviations

AR6	IPCC's Sixth Assessment Report
BCP	Business Continuity Plan
BoD	Board of Directors
BPA	Bisphenol A
CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon Capture and Storage
CCU	Carbon capture and utilization
CDSB	Climate Disclosure Standards Board
CE-CFP	Carbon Footprint of Circular Economy Product
CFP	Carbon Footprint of Product
CFR	Carbon Footprint Reduction
CGS	Corporate Governance and Sustainability Committee
CRROs	Climate-related Risks and Opportunities
CSRD	European Union's Corporate Sustainability Reporting Directive
DJSI	Dow Jones Sustainability Indices
EA	Ethanolamine
EEC	Eastern Economic Corridor
EFRAG	European Financial Reporting Advisory Group
EO	Ethylene Oxide
ERM	Enterprise Risk Management
ERMC	Enterprise Risk Management Committee
ESRS	European Sustainability Reporting Standards
ETS	Emission Trading System
GHG	Greenhouse Gas
GMC	Group Management Committee
GRI	Global Reporting Initiative
HDI	Hexamethylene Diisocyanate
HDPE	High-density Polyethylene
HSBC	Hydrogenated Styrenic Block Copolymers
HVB	High Value Business
ICP	Internal Carbon Pricing
IEA	International Energy Agency
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
ISSB	International Sustainability Standards Board
LCA	Life Cycle Assessment
LT-LEDS	Thailand's Long-term Low Greenhouse Gas Emission Development Strategy

MC	Management Committee
MEG	Monoethylene Glycol
NDCs	Nationally Determined Contributions
NZE2050	Net Zero Emissions by 2050
PBS	Bio-polybutylene Succinate
PCR	Post-consumer Recycled
PET	Polyethylene Terephthalate
PLA	Polylactic Acid
PP	Polypropylene
PPAs	Power Purchase Agreements
PTA	Purified Terephthalic Acid
PU	Polyurethane
RMC	Risk Management Committee
SASB	The Sustainability Accounting Standards Board
SDC	Sustainability Development Committee
SEC	The Securities and Exchange Commission
SET	The Stock Exchange of Thailand
SSPs	Shared Socioeconomic Pathways
STEPS	Stated Energy Policies Scenario
SWRO	Seawater Reverse Osmosis
TFRS	Thai Financial Reporting Standards
TGO	Thailand Greenhouse Gas Management Organization
UN SDGs	United Nations Sustainable Development Goals
WRI	The World Resources Institute
WWRO	Wastewater Reverse Osmosis
ZLD	Zero Liquid Discharge

1. Summary of Executive

In June 2023, the International Sustainability Standards Board (ISSB) released IFRS Sustainability Disclosure, comprising IFRS S1 *General Requirements for Disclosure of Sustainability-related Financial Information* and IFRS S2 *Climate-related Disclosures.* These standards were established to create a global baseline for sustainability-related financial disclosures, responding to the increasing demand from investors, regulators, and other stakeholders for consistent, comparable, and decision-useful information on sustainability- and climate-related risks and opportunities. Both standards became effective for annual reporting periods beginning on or after 1 January 2024, with provisions for early adoption and transition reliefs to facilitate implementation.

In Thailand, the Securities and Exchange Commission (SEC) has introduced an ISSB-aligned roadmap to gradually integrate these global standards into domestic reporting requirements. As part of this plan, revisions to the mandatory disclosure will initially require SET50-listed companies, including companies such as GC, to begin disclosing sustainability-related information in alignment with ISSB standards for the 2026 fiscal year, to be reported in 2027. To support effective implementation, the SEC will allow the use of transition reliefs, including the option for companies to initially focus on climate-related disclosure under IFRS S2 before fully adopting IFRS S1 in subsequent reporting cycles. This regulatory development is part of the SEC's broader strategy to enhance the credibility and comparability of ESG disclosures and support Thailand's transition to a sustainable and low-carbon economy.

GC, a leading company in the chemical industry, is committed to maintaining its leadership in sustainability by integrating sustainable practices into its strategic direction and operations to support long-term growth and competitiveness. In line with this commitment, GC aims to fully comply with the IFRS Sustainability Disclosure Standards issued by the ISSB. This 2024 ISSB report represents GC's first voluntary disclosure aligned with these standards, using relevant information for the fiscal year ending 31 December 2024. As a first step, the report has been partially prepared in accordance with the IFRS Sustainability Disclosure Standards, applying transition reliefs such as exemptions from presenting comparative information and focusing exclusively on climate-related disclosures under IFRS S2.

To demonstrate GC's commitment to future compliance with IFRS S1, GC has included key disclosures aligned with the general requirements in this 2024 ISSB report. These include information on the alignment with consolidated financial statements, the reporting boundary, significant judgments made in reporting sustainability-related information, areas involving measurement uncertainty, and the process used to conduct a double materiality assessment to identify relevant sustainability-related risks and opportunities (for further details about sustainability-related risks and opportunities, please see *Integrated Sustainability Report 2024*).

In addition, GC disclosed climate-related matters in alignment with IFRS S2 to provide transparent, consistent, and decision-useful information to investors and stakeholders on how climate-related risks and opportunities may affect its enterprise value over the short-, medium-, and long-term. There are four core content pillars, as follows:

Governance – GC has established a two-tier climate governance structure to drive progress toward its Net-Zero 2050 target. At the Board level, the Board of Directors oversees the integration of climate-related risks into strategy and risk management. The CGS Committee sets climate policies and monitors implementation, while the RMC reviews risk policies and advises on climate-related projects with significant impact. At the Management level, the SDC supports CGS in setting climate-related targets and monitor progress towards those targets. To strengthen accountability, climate-related performance is embedded in incentive schemes, linking compensation to progress on key climate goals.

Strategy – In 2024, GC identified four material physical risks—extreme heat, riverine flooding, drought, and water stress—alongside carbon pricing as a transition risk and sustainable products as a transition opportunity, all of which could reasonably be expected to affect GC's prospects, business activities, and value chain. Using its ERM criteria, GC then ranked these factors to shape mitigation and adaptation actions, highlighting drought, water stress, carbon pricing, and sustainable products as top priorities. To demonstrate climate resilience, GC applied scenario analyses across short- (up to 2030), medium- (2031-2040), and long-term (2041-2050) horizons, applying Shared Socio-economic Pathways (SSPs) for physical risks, including SSP1-2.6 as low emissions scenario, SSP2-4.5 as business-as-usual scenario, and SSP5-8.5 as high emissions scenario, as well as IEA World Energy Outlook scenarios for transition risks and opportunities, comprising Stated Energy Policies Scenario (STEPS) and Net Zero Emissions by 2050 (NZE2050). The summary of climate-related risks and opportunities is presented in **Table** below.

Table Summary of climate-related risks and opportunities

CRROs	Baseline (2025)	Scenarios	Timeframe		
			Short-term[1]	Medium-term[2]	Long-term[3]
Physical risks					
Extreme Heat	Medium High	SSP1-2.6	Extremely High	Extremely High	Extremely High
		SSP2-4.5	Extremely High	Extremely High	Extremely High
		SSP5-8.5	Extremely High	Extremely High	Extremely High
Riverine Flood	Medium Low	SSP1-2.6	High	High	Medium Low
		SSP2-4.5	Medium Low	Medium Low	Medium Low
		SSP5-8.5	Medium Low	Medium Low	High
Drought	High	SSP1-2.6	Medium High	Medium Low	Medium High
		SSP2-4.5	Medium High	Medium High	Medium High
		SSP5-8.5	Medium High	Medium High	Medium High
Water Stress	High	SSP1-2.6	High	High	High
		SSP5-8.5	High	High	High
Transition risk					
Carbon Price	Medium High	STEPS	Medium High	High	Extremely High
		NZE2050	High	Extremely High	Extremely High
Transition opportunity					
Sustainable Products	Medium High	STEPS	Medium High	High	Extremely High
		NZE2050	High	Extremely High	Extremely High

1 Short-term refers to period up to 2030.

2 Medium-term refers to period from 2031 to 2040.

3 Long-term refers to period from 2041 to 2050.

Furthermore, those climate-related risks and opportunities are quantified both current and anticipated financial impacts to comprehensively understand their impacts on decision-making. Guided by these insights, GC has adopted a three key decarbonization strategy—Efficiency-driven, Portfolio-driven, and Compensation-driven—to address the identified climate-related risks and opportunities and keep GC on track for its 2050 net-zero target. The following **Table** presents the summary of current and anticipated financial effects of climate-related risks and opportunities.

Table Summary of current and anticipated financial effects of climate-related risks and opportunities

CRROs	Financial Effects (Unit: Million Baht)				
	Current (2025)	Scenarios	Short-term[1]	Medium-term[2]	Long-term[3]
Physical risks					
Extreme Heat	No Financial Impact	SSP1-2.6	<0.01	<0.01	0.02
		SSP2-4.5	<0.01	0.02	0.08
		SSP5-8.5	<0.01	0.08	0.09
Riverine Flood	No Financial Impact	SSP1-2.6	No Financial Impact		
		SSP2-4.5	No Financial Impact		
		SSP5-8.5	No Financial Impact		
Drought/Water Stress[4]	No Financial Impact	SSP1-2.6	No Impact	11	No Impact
		SSP2-4.5	19	24	
		SSP5-8.5	46	No Impact	29
Transition risk					
Carbon Price	No Financial Impact	STEPS	No Financial Impact	49.83	231.69
Transition opportunity					
Sustainable Products	114,006[5]	STEPS	182,052[6]	During assessment	
	8% of EBITDA[7]		10% of EBITDA[7]		

Risk Management – GC has established processes to identify, assess, prioritize, and monitor climate-related risks and opportunities. Physical risks are identified using public data from reputable sources such as the World Bank and the World Resource Institute (WRI), while transition risks and opportunities are assessed based on key drivers of the low-carbon transition. Identified risks are prioritized using GC's ERM criteria, considering both likelihood and impact, to inform mitigation and adaptation strategies. These strategies are cascaded to executives and operational teams to support decision-making. Climate-related risks and opportunities are integrated into GC's ERM framework and overseen by the Enterprise Risk Management Committee (ERMC) to ensure proactive management.

4 GC has implemented mitigation and adaption strategies to cope with drought and water stress. Thus, the financial effects are quantified equitably.

5 The amount is quantified from actual sales of sustainable products.

6 The amount is quantified from forecasted sales of sustainable products.

7 The amount is expected from R&D proportion to GC's EBITDA

Metrics & Targets – GC is committed to achieving net-zero GHG emissions for Scope 1 and Scope 2 by 2050, using 2021 as the base year. Its interim targets include a 20% reduction in Scope 1 and 2 emissions by 2030 and a 50% reduction in Scope 3 emissions by 2050. The following **Table** presents the summary of performance against targets for the year 2024.

Table Summary of performance against targets

Metrics	Unit	Actual 2024	Target 2024[8]	Target by timeframe		
				Short-term	Medium-term	Long-term
GHG Emissions[9] for scope 1 & 2	Million tons CO2e	7.83	8.96	Reduce 20% by 2030	n/a	Net Zero by 2050

To demonstrate the effectiveness of its climate management, GC also disclosed performance metrics in line with IFRS S2 requirements, including both cross-industry and industry-specific metrics for the chemical sector, based on SASB standards.

This report marks a significant milestone in GC's sustainability journey—enhancing stakeholder confidence, reinforcing corporate accountability, and aligning with global emerging sustainability reporting standards as issued by ISSB. While this represents meaningful progress, GC acknowledges that further enhancements are necessary. Opportunities remain to improve data completeness, strengthen integration across business functions, and deepen the alignment of disclosures with the full scope of IFRS Sustainability Disclosure Standards. Achieving full compliance is a strategic priority for the coming year, and GC is committed to continuously improving its sustainability reporting practices, systems, and internal capabilities to meet evolving stakeholder expectations and regulatory requirements. Through these ongoing efforts, GC seeks not only to comply, but to lead by example in driving transparent, credible, and impactful sustainable action.

[8] As of the reporting period, the entity's climate-related targets and methodologies have not been validated by an external third party. The organization is currently evaluating options for third-party validation as part of its roadmap to enhance credibility and transparency.

[9] 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)

2. Basis of Preparation

2.1 Compliance with IFRS Sustainability Disclosure Standards

This ISSB report of PTT Global Chemical Public Company Limited ("GC") and its subsidiaries are partially prepared in accordance with the IFRS Sustainability Disclosure Standards as issued by the International Sustainability Standards Board (ISSB). GC plans to achieve full compliance with IFRS Sustainability Disclosure Standards when sufficient sustainability data becomes available, and after they have further refined their control systems and processes for sustainability disclosure.

Furthermore, GC has also leveraged the disclosure topics within the Sustainability Accounting Standards Board (SASB) standards in the preparation of this report.

2.2 Alignment with financial statements

This ISSB report, prepared for GC, is intended to be read in conjunction with GC's consolidated financial statements[10], which are prepared in accordance with TFRS Standards. The report covers the 12-month period ended 31 December 2024, aligning with the reporting period of GC's consolidated financial statements.

The sustainability-related financial disclosures cover the same reporting entity as the consolidated financial statements, specifically GC and its subsidiaries. In preparing sustainability-related financial disclosures, GC has comprehensively assessed its own operations and value chain, extending to its joint ventures and associates.

To ensure consistency, the presentation currency of the sustainability-related financial disclosures is Thai Baht, aligning with the presentation currency of the consolidated financial statements. Moreover, disclosed amounts are rounded to the nearest million, except were indicated otherwise.

2.3 First-time adoption of IFRS Sustainability Disclosure Standards and transitional reliefs

The Thai Securities and Exchange Commission (SEC) is actively developing an ISSB-aligned roadmap to integrate IFRS Sustainability Disclosure Standards into its mandatory disclosure forms, specifically 56-1 One Report and 69-1. This initiative will mandate SET50-listed companies, including GC, to report disclosures in accordance with these standards by 2027, based on 2026 data[11].

[10] PTTGC (2024), Annual Registration Statements/Annual Report 2024(Form 56-1 One Report), page 88, Shareholding Structure in Subsidiaries and Affiliates, https://www.pttgcgroup.com/en/document/viewer/137862/form-56-1-one-report-2024

[11] SEC (2024), The Securities and Exchange Commission, Thailand, Public Consultation Aor Sor Yor. 50 /2567 on the Principle of Thailand Sustainability Disclosure Roadmap regarding International Sustainability Standards (ISSB Roadmap) dated on 19 November 2567, https://www.sec.or.th/Documents/PHS/Main/1030/hearing502567en.pdf

To solidify its position as a leader in Thailand's sustainability reporting landscape, GC has voluntarily adopted IFRS Sustainability Disclosure Standards for the first time for its reporting period ended 31 December 2024. The following standards have been applied for the reporting period commencing 1 January 2024:

- IFRS S1 *General Requirements for Disclosure of Sustainability-related Financial Information*[12]

- IFRS S2 *Climate-related Disclosure*[13]

As of 31 December 2024, no other IFRS Sustainability Disclosure Standards had been issued by the ISSB.

In addition, the Thai SEC has considered various transition reliefs for the first time adoption of IFRS Sustainability Disclosure Standards[14]. GC has applied the following transition reliefs:

- Relief from the requirement to disclose comparative information for the first-year reporting period.

- Relief from the scope of reporting, limiting disclosures to climate-related risks and opportunities for the first-year reporting period.

- Relief from issuing the ISSB report concurrently with the consolidated financial statements which were issued on 17 February 2025. This report has been issued on 30 July 2025.

[12] ISSB (2023) International Sustainability Standards Board (ISSB), IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information, https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/ifrs-s1-general-requirements/

[13] ISSB (2023) International Sustainability Standards Board (ISSB), IFRS S2 Climate-related Disclosures, https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/ifrs-s2-climate-related-disclosures/

[14] SEC (2024), The Securities and Exchange Commission, Thailand, Public Consultation Aor Sor Yor. 50 /2567 on the Principle of Thailand Sustainability Disclosure Roadmap regarding International Sustainability Standards (ISSB Roadmap) dated on 19 November 2567, page 10, Section 5.5 Transition Reliefs https://www.sec.or.th/Documents/PHS/Main/1030/hearing502567en.pdf

3. GC's Business Activities and Value Chain

3.1 Our Business Activities and Value Chain

GC produces over 14.41 million tons per year of petrochemical and chemical products in 2024, with a crude oil and condensate refining capacity of 280,000 barrels per day. The company operates 49 production facilities in Thailand and 43 facilities overseas, making it the largest integrated petrochemicals and refining company in Thailand. Additionally, GC is a leading player in the petrochemical industry across the Asia-Pacific region[15].

GC's business structure can be divided into five core business groups and other service business groups to support business operations (**Figure 3-1**). This approach ensures the delivery of high-quality products while promoting sustainability for customers and stakeholders.

The details of GC's value chain, business units, geographical locations and their revenue stream by each business unit are summarized in **table 3-1** below:

[15] PTTGC (2024), Annual Registration Statements/Annual Report 2024(Form 56-1 One Report), page 42, Business Structure and Operation, https://www.pttgcgroup.com/en/document/viewer/137862/form-56-1-one-report-2024

Table 3-1 GC's value chain, business units, geographical locations and their revenue stream by each business unit

Value Chain	Business Units	Description	Geographical Location	Revenue (in million Baht)
Upstream	Refinery and Shared Facilities	GC operates a state-of-the-art refinery with hydrocracker and vis breaker units, converting low-value fuel oil into higher-value products. With a refining capacity of 145,000 barrels/day of crude and 135,000 barrels/day of condensate, its flexible operations adapt to market volatility and evolving customer demand.	Rayong, Thailand	320,492
	Aromatics	GC produces and distributes key aromatics—paraxylene, benzene, toluene, and others—serving as feedstock for downstream industries. Its two plants, with 2.4 million tons/year capacity, also generate by-products like LPG and light naphtha for olefins, and heavy aromatics for refining into fuels, ensuring integrated, efficient resource utilization across operations.	Rayong, Thailand	
	Olefins	GC operates five olefins' plants with a total capacity of 3.8 million tons/year, producing ethylene, propylene, and butadiene using flexible feedstocks from natural gas and internal sources. By-products are further upgraded across the value chain. GC also generates and sells utilities—electricity, steam, and water—to lower costs and earn revenue.	Rayong, Thailand	
Intermediates	Ethylene Oxide and Derivatives	GC produces ethylene oxide (EO) and derivatives to enhance olefins value and support Thailand's competitiveness by replacing imports with high-value products. EO is used to produce ethylene glycols, especially MEG for polyester and PET bottles. GC operates a dedicated EO plant in Rayong, serving industrial and consumer demand.	Rayong, Thailand	77,528
	Phenols	GC produces phenol, acetone, and bisphenol A (BPA) as key intermediates for engineering plastics and high-demand sectors like automotive, electronics, and construction. Derived from benzene and propylene, these products serve multiple downstream industries.	Rayong, Thailand	
	Others Intermediates	GC produces purified terephthalic acid (PTA) through its subsidiary GC-M PTA Co., Ltd., supplying key feedstock for polyester fibers and PET resin used in textiles and packaging. PTA also supports coatings for automotive and electronics, and is used in construction-related oil colors, serving both consumer and industrial applications.	Rayong, Thailand	

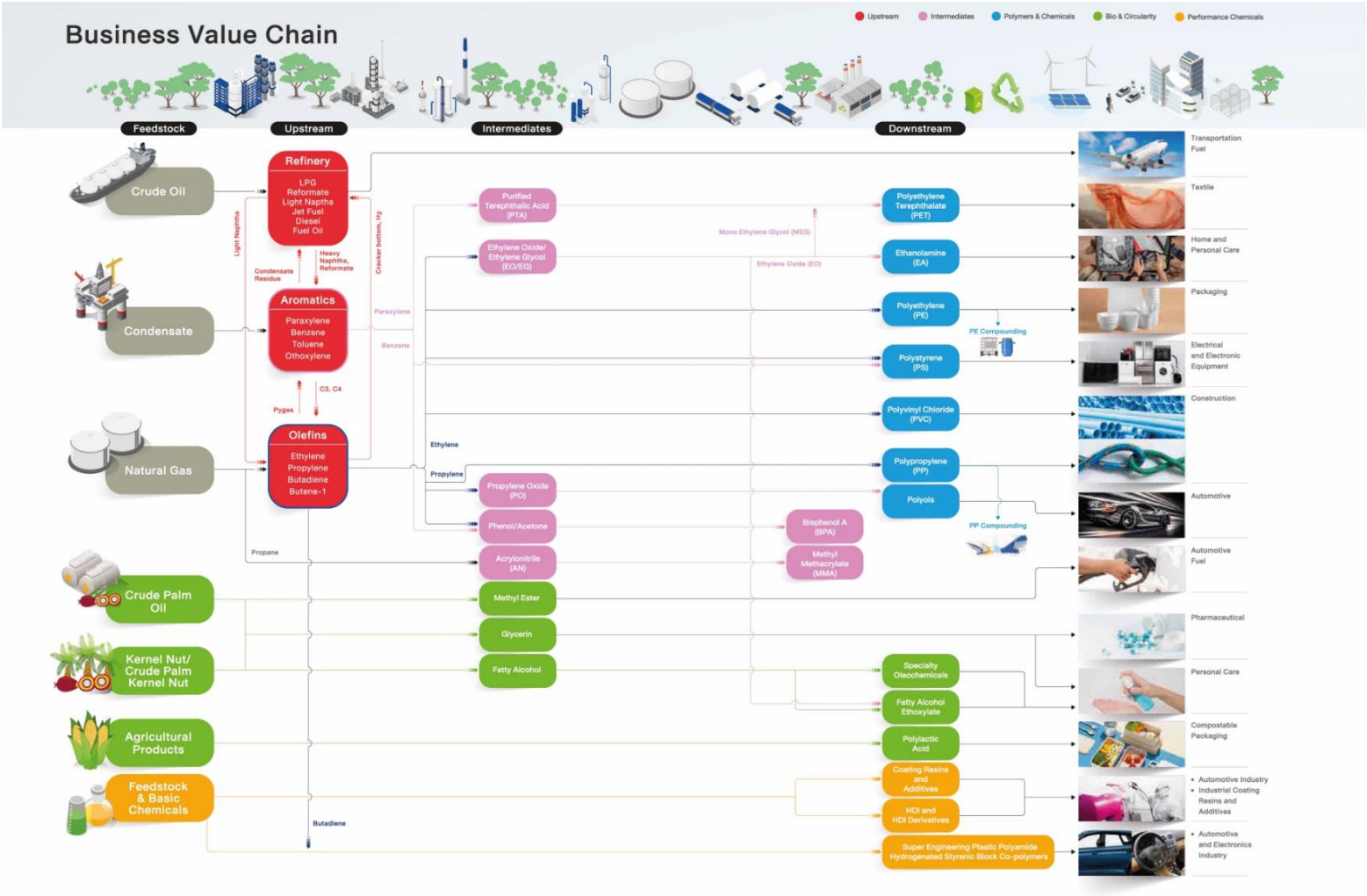
Table 3-1 GC's value chain, business units, geographical locations and their revenue stream by each business unit (*Cont.*)

Value Chain	Business Units	Description	Geographical Location	Revenue (in million Baht)
Polymers and Chemicals	Polymers	GC operates 20 polymer plants in Thailand producing key downstream petrochemicals used in construction, packaging, automotive, agriculture, and appliances. It also runs roto molding and PP compounding plants across several countries. Polymers are marketed under GC's trademarks through subsidiaries and joint ventures, supporting diverse industrial applications globally.	Rayong, Thailand	98,750
	Chemicals	GC produces ethanolamine (EA) for use in cosmetics, pharmaceuticals, and cement industries, operating its EA plant in Rayong. Through GC Polyols Co. Ltd., a joint venture, GC manufactures polyols and premix polyols as feedstock for polyurethane, supporting growing market demand with integrated production and customized solutions.	Rayong, Thailand	
Bio and Circularity	Bioplastics and Biochemicals	GC's Bio & Circularity Business produces bio-based products from natural feedstocks like palm oil, corn, and sugarcane for industries including personal care, food, and bioplastics. Through joint ventures NatureWorks and PTTMCC, GC manufactures polylactic acid (PLA) and bio-polybutylene succinate (PBS), expanding sustainable bioplastic production in Thailand.	Rayong (PBS) and Nakhon Sawan (PLA), Thailand	16,686
	Post-Consumer Recycled	GC produces high-quality post-consumer recycled (PCR) resins, including food-grade PCR PET and packaging-grade PCR HDPE, through ENVICCO, a joint venture with ALPHA. These sustainable resins meet international safety standards and are used in food packaging and personal care product containers, matching the performance of virgin resins.	Rayong, Thailand	
	Value Added Oleochemicals	GC produces basic oleochemicals like methyl ester, fatty alcohols, ethanol, glycerin, and fatty alcohol ethoxylate used in fuels, personal care, and green products, primarily through Global Green Chemicals in Thailand. Specialty oleochemicals are manufactured via EMERY, a joint venture operating in Europe and the U.S., serving global markets across diverse industries.	Rayong and Chonburi (GGC), Thailand The U.S. (EMERY)	

Table 3-1 GC's value chain, business units, geographical locations and their revenue stream by each business unit (*Cont.*)

Value Chain	Business Units	Description	Geographical Location	Revenue (in million Baht)
Performance Chemicals	Performance Chemicals	GC's performance chemicals encompass coating resins and additives for durable automotive and construction coatings, Hexamethylene Diisocyanate (HDI) and derivatives for PU coatings, and super engineering plastics like Polyamide (PA9T) and Hydrogenated Styrenic Block Copolymers (HSBC), serving advanced applications in automotive and electronics industries.	Rayong, Thailand USA, Europe	91,395
Service and Others	Service and Others	GC supports its core business through diverse services including marketing and sales with authorized dealers, packaging market development, and upcycling initiatives. It provides integrated logistics, jetty and chemical storage, pipeline infrastructure, utilities, land and property management, and ICT solutions. Additional services cover plant maintenance, engineering, safety, environmental compliance, social enterprise consulting, financial management, corporate venture capital investments, and outsourcing manpower to enhance operational stability and business continuity.	Bangkok and Rayong, Thailand And overseas	3,699

Figure 3-1 GC's Value Chain[16]



[16] PTTGC (2024), Annual Registration Statements/Annual Report 2024(Form 56-1 One Report), page 46, Business Value Chain, https://www.pttgcgroup.com/en/document/viewer/137862/form-56-1-one-report-2024

4. Reporting Boundary

4.1 Reporting Entity

The reporting entities included in this report are the same as those included in GC's 31 December 2024 consolidated financial statements[17]. The reporting boundary includes the following entities:

Own Operations

- Head Office
- Branch 1 (Rayong office Branch)
- Branch 2 (Olefin 1 Branch)
- Branch 3 (Olefin 2 Branch)
- Branch 4 (Aromatics 1 Branch)
- Branch 5 (Aromatics 2 Branch)
- Branch 6 (Refining Branch)
- Branch 7 (Jetty and Buffer Tank Farm Branch)
- Branch 8 (Aromatics reserve Branch)
- Branch 9 (Lab Service Center Branch)
- Branch 10 (GC 10 Branch)
- Branch 11 (Olefin 3 Branch)
- Branch 12 (Polyethylene Branch)
- Branch 13 (Innoplus Solution Center Branch)
- Branch 14 (GC 14 Branch)
- Branch 15 (GC Chemical Experience Campus)
- Branch 16 (Glycol Plant)
- Branch 17 (Polystyrene Plant)
- Branch 18 (Phenol Plant)
- Branch 19 (Oxirane Plant)

Subsidiaries

- Allnex
- GCP
- GC-M PTA
- TPRC
- GGC
- Envicco
- GCEC
- GCI
- GCM
- GCM China
- GCM Indonesia
- GCM Myanmar
- GCM Vietnam
- GCME
- GCTC
- NPC
- GC BV
- GC Inter
- GCA
- GCA Corp
- GCAS
- GCV
- GCVA
- SUN

4.2 Reporting Boundary for GHG emissions

In this report, GC measures GHG emissions in accordance with the GHG Protocol: A Corporate Accounting and Reporting Standard (2004) ("the GHG Protocol 2004") as required by IFRS S2 *Climate-related Disclosure.*

GC uses the Operational Control approach for GHG accounting. Under the Operational Control approach, GC accounts for GHG emissions from operations where it has full control over (all or nothing)[18]. The Operational Control, excluding joint ventures and oversea facilities, gets by:

1) GC own 100% in equity share of the Company; or

2) GC has the full authority to introduce and implement its operating policies at the operational level.

[17] PTTGC (2024), Annual Registration Statements/Annual Report 2024(Form 56-1 One Report), page 88, Shareholding Structure in Subsidiaries and Affiliates, https://www.pttgcgroup.com/en/document/viewer/137862/form-56-1-one-report-2024

[18] PTTGC GHG Report (2023) GC Greenhouse Gas Report, https://sustainability.pttgcgroup.com/storage/document/climate-change-strategy-and-target/gc-greenhouse-gas-report.pdf

5. Judgements and Measurement Uncertainties

GC exercised judgement in several key areas, including the identification of sustainability-related risks and opportunities through the Double Materiality assessment; the identification of climate-related risks and opportunities; the determination of the reporting boundary and measurement approach for GHG emissions; and the selection of appropriate metrics and targets aligned with disclosed sustainability-related risks and opportunities. The details of these key areas involving significant judgments are summarized in **Table 5-1** below:

Table 5-1 Key areas using significant judgments

Key areas	Descriptions
Identification of Sustainability-related Risks and Opportunities	GC conducted the Double Materiality Assessment to identify sustainability-related risks and opportunities that are relevant to its operations, business model and value chain (see Section 6: *Materiality Assessment*). Significant judgement was applied throughout the process, particularly in assessing impact materiality and financial materiality, as well as in determining which topics to disclose.
Identification of Climate-related Risks and Opportunities	GC conducted a Climate Risk Assessment to identify physical risks, transition risks, and opportunities significantly relevant to its operations, business model, and value chain (see Section 9: *Risk Management*). Significant judgment was exercised throughout the process—from the selection of climate data sources and climate scenarios used for analysis to the determination of which climate-related risks and opportunities to disclose in this ISSB report.
Reporting Boundary for GHG Emissions	GC applied the Operational Control approach to define the organizational boundary for reporting its GHG emissions. Under this approach, GC reports emissions from operations which it has full authority to introduce and implement operating policies and procedures. Significant judgement was exercised in two key areas: (1) selecting the most appropriate boundary-setting methodology – among equity share, financial control, and operational control – requires careful consideration and alignment with global reporting standards such as the GHG Protocol, and (2) identifying which operations fall under GC's operational control demands a thorough analysis of the extent of authority GC exercises across its subsidiaries, joint ventures, and other entities within the value chain (see Section 4.2: *Reporting Boundary for GHG emissions*). These judgements directly impact the completeness and accuracy of GC's GHG emissions inventory and its climate-related disclosures.
Measurement Approach for Scope 3 GHG Emissions	GC exercised significant judgement in two key areas: (1) identifying category for scope 3 GHG emissions considering emissions sizing, level of influence, risk, opportunity, sectoral guidance, outsourcing, and employee engagement, and (2) selecting the most appropriate calculation methods for each identified category of scope 3 GHG emissions.
Selection of Appropriate Metrics and Targets	GC exercised significant judgment in selecting metrics and targets for disclosure, ensuring alignment with SASB Standards and other recommended frameworks under the IFRS Sustainability Disclosure Standards—such as the GRI Standards and the CDSB Framework—and ensuring relevance to the sustainability- and climate-related risks and opportunities disclosed in this ISSB report.

In addition, estimates have been used to determine certain amounts that cannot be directly measured, particularly in situations where data pertains to entities within the value chain, involves forward-looking assumptions, or where information is limited or incomplete. The detail of the measurement uncertainty is summarized in **Table 5-2** below:

Table 5-2 Measurement Uncertainty

Key areas	Descriptions
Current / Anticipated Financial Implications of Sustainability- and Climate-related Risks and Opportunities	GC estimated both the current and anticipated financial impacts of sustainability-related risks and opportunities identified when assessing their financial materiality under the Double Materiality Assessment Process. Meanwhile, GC also estimated both the current and anticipated financial impacts of climate-related risks and opportunities. This includes evaluating how such factors may affect GC's financial position, financial performance, and cash flows over short-, medium-, and long-term horizons. However, the ability to quantify these financial impacts is subject to inherent limitation, primarily due to data availability, uncertainty of future scenarios, and the evolving nature of sustainability- and climate-related disclosures. As a result, estimation is applied using reasonable and supportable assumptions and information that is available to GC at the reporting date without undue cost or effort.
Cross-industry and industry-based metrics in alignment with IFRS S2 *Climate-related Disclosure*	GC is required to disclose both cross-industry and industry-based metrics in accordance with IFRS S2 Climate-related Disclosures. Certain metrics—particularly those related to GHG emissions—require estimation due to inherent uncertainties associated with activity data, emission factors, and data availability across the value chain.

6. Materiality Assessment

GC conducts an annual materiality assessment covering Environmental, Social, and Governance (ESG) dimensions using the Double Materiality approach to identify sustainability-related risks and opportunities most relevant to GC and its stakeholders. This approach recognizes that such risks and opportunities can be material from two distinct perspectives: **(1) Impact Materiality** – assessing GC's actual and potential impacts on society and the environment across its operations, business model, and value chain; and **(2) Financial Materiality** – evaluating how sustainability-related risks and opportunities may affect GC's financial position, performance, and cash flows over various time horizons across its business model and value chain.

The Double Materiality assessment was conducted in accordance with the European Union's Corporate Sustainability Reporting Directive (CSRD) and the European Sustainability Reporting Standards (ESRS) developed by the European Financial Reporting Advisory Group (EFRAG), along with other ESG frameworks such as the GRI Standards, the AA1000 AccountAbility Principles (AA1000AP), the Dow Jones Sustainability Indices (DJSI), and the UN Sustainable Development Goals (SDGs). This ensures that GC's materiality assessment methodology is widely accepted and benchmarked against peers within the industry in which it operates.

In 2024, GC conducted a Double Materiality assessment in collaboration with external advisors. Each step of the assessment was verified by an independent third party[19]. The overall process, as illustrated in **Figure 6-1**, is summarized through four steps as follows:

Figure 6-1 GC's Double Materiality Assessment Process

[19] PTTGC (2024) Integrated Sustainability Report 2024, page 48, Sustainability Materiality, https://sustainability.pttgcgroup.com/storage/document/integrated-sustainability-reports/2024/pttgc-isr2024.pdf

Step 1: Standards and Peers Identification

GC conducted a study and review of national and global trends in material sustainability issues, as well as peer reviews across the petrochemical industry, to identify 15 material topics relevant to GC's context. These topics were selected by considering environmental, social, and economic impacts to ensure their materiality and alignment with stakeholder expectations.

Step 2: Issue Identification and Impact Pathway Development

GC engages both internal and external stakeholders to analyze the impacts, risks, and opportunities related to its operations. This process includes executive interviews to verify and prioritize material topics, as well as stakeholder interviews and surveys to validate the significance of 15 identified material topics and gather additional feedback. GC also maps its value chain to assess linkages with these topics and conducts a comprehensive analysis of both short- and long-term impact materiality—positive, negative, actual, and potential—across environmental and social dimensions. In parallel, financial materiality is evaluated by identifying sustainability-related risks and opportunities that could affect the company's performance and financial position, guiding the development of responsive and risk-mitigating strategies.

Step 3: Impact Assessment and Validation

GC assessed impact materiality using both quantitative and qualitative data from stakeholder engagement, with severity (scale, scope, and irremediable character) on the Y-axis and likelihood on the X-axis of the Materiality Matrix. Meanwhile, financial materiality was assessed using data aligned with GC's enterprise risk management framework. The results of both assessments were validated by experts and presented to executives and the Corporate Governance and Sustainability Committee (CGS) for approval. Moreover, the overall process and results were also reviewed by an independent third party.

Step 4: Double Materiality Assessment

GC conducted a Double Materiality assessment, evaluating both impact materiality and financial materiality. A Materiality Matrix was developed to illustrate the relationship between the two dimensions. In addition, the results were presented to executives and the Sustainability Development Committee (SDC), with material topics approved by the Corporate Governance and Sustainability Committee (CGS) to ensure appropriate implementation.

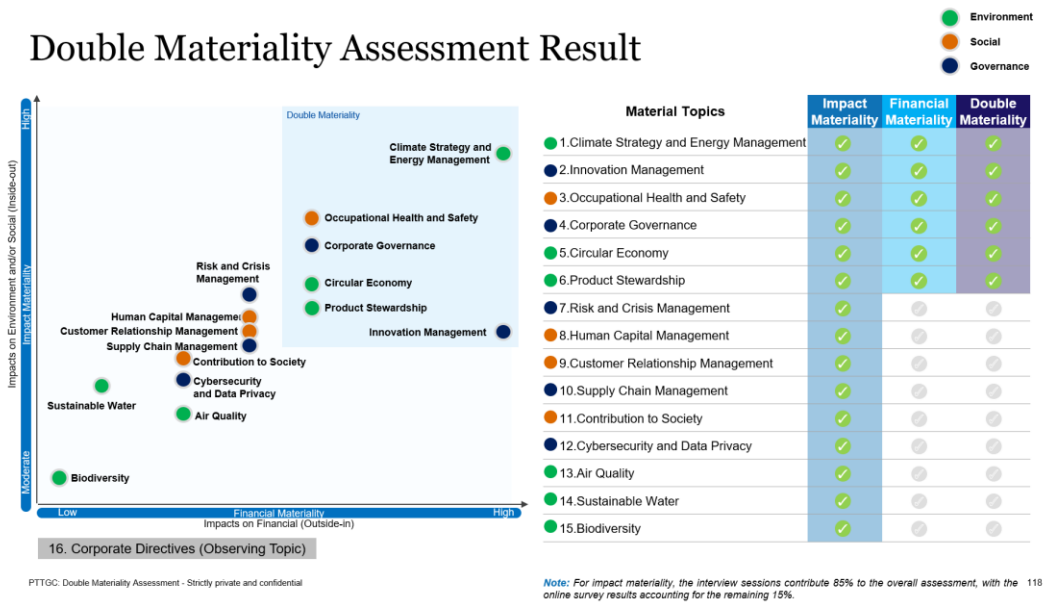


Figure 6-2 GC's Double Materiality Results

Based on the 2024 assessment results presented in **Figure 6-2**, six material topics have been identified as financially significant and critical to sustainable value creation. These topics are comprehensively disclosed in the **Integrated Sustainability Report 2024**, reflecting GC's commitment to transparent, investor-focused ESG reporting, while also addressing broader stakeholder and regulatory expectations.

Furthermore, as GC has voluntarily adopted the IFRS Sustainability Disclosure Standards for the 2024 reporting period, there are opportunities for improvement. Achieving full compliance with the IFRS Sustainability Disclosure Standards is our ambition for the coming year.

7. Governance

GC has put in place a decarbonization governance and management structure that extends from **the Board of Directors (BoD)** to front-line operations, thereby ensuring integrated and efficient progress towards its Net-Zero target[20]. At the board level, the **Corporate Governance and Sustainability Committee (CGS)** meets quarterly to oversee all climate-related matters. Supporting the CGS is the **Sustainability Development Committee (SDC)** – an executive-level body chaired by the Executive Vice President of Sustainability, GC's most senior sustainability officer. In addition, the SDC sets strategic direction for mitigating climate-change impacts, including establishing GHG reduction targets and refining investment plans to prioritize emissions reduction initiatives. It also designs the implementation road maps and performance-measurement systems that embed these strategies into day-to-day operations. The overall climate governance structure is depicted in **Figure 7-1** below.

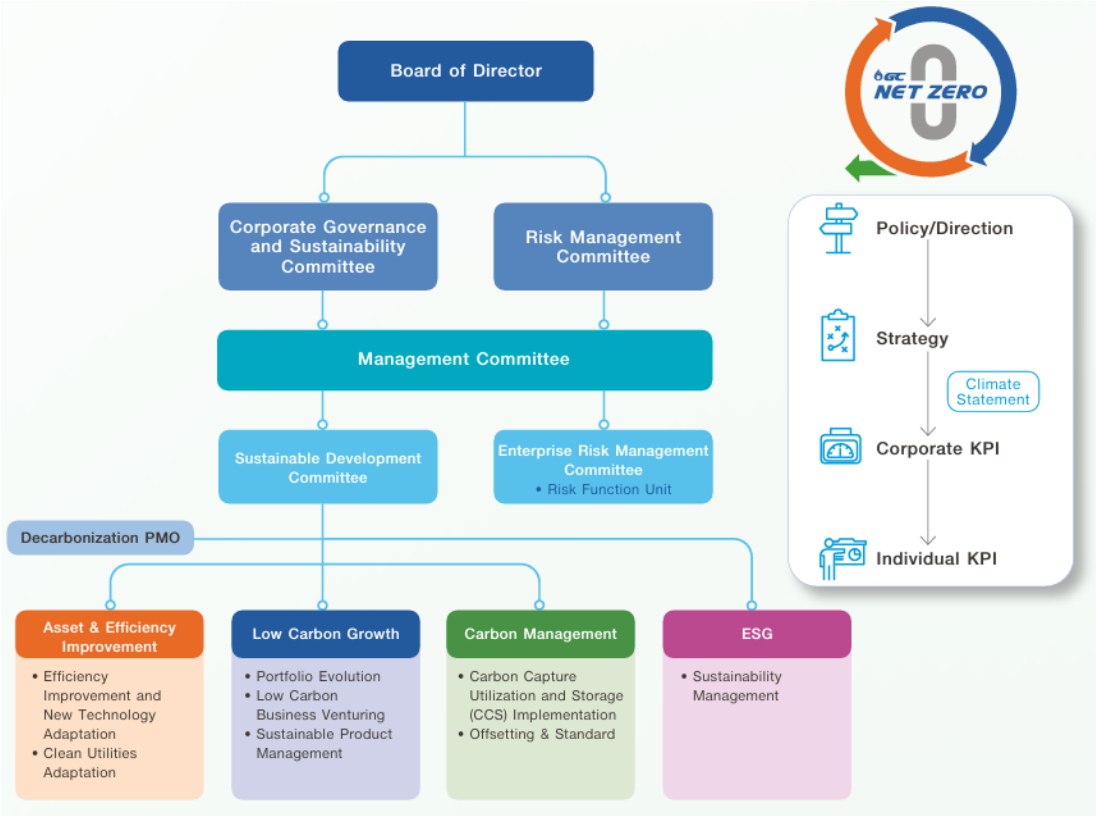


Figure 7-1 GC's Climate Governance Structure

7.1 Roles and Responsibilities of Governing Bodies

GC clearly defines roles and responsibilities for its governing bodies, including Board of Directors (BoD), Corporate Governance and Sustainability Committee (CGS), Sustainability Development Committee (SDC), to effectively manage climate-related risks and seizing opportunities in the transition to a low-carbon economy. The details of roles and responsibilities for governing bodies are disclosed in **table 7-1** below, while the details of roles.

[20] PTTGC (2024) Integrated Sustainability Report 2024, page 147, Climate Governance and page 148, Organizational Structure of Climate Governance, https://sustainability.pttgcgroup.com/storage/document/integrated-sustainability-reports/2024/pttgc-isr2024.pdf

Table 7-1 Roles and Responsibilities of Governing Bodies

Governing Body	Roles and Responsibility
Board of Directors[21] (BoD)	The Board Chair holds the highest authority within the Board of Directors and plays a central role in ensuring that climate-related risks and opportunities are integrated into GC's strategy, major transactions, and risk management processes. This includes overseeing the incorporation of climate considerations into GC's vision, mission, and strategic direction; requiring climate impact assessments for significant investment decisions; and ensuring that enterprise risk management policies reflect both transition and physical climate risks. In addition, the Board Chair—kept informed of climate-related risks and opportunities through Board meetings as needed—ensures that these factors are systematically evaluated, embedded in governance practices, and aligned with GC's long-term goals for sustainable value creation.
Corporate Governance and Sustainability Committee[22] (CGS)	The **Corporate Governance and Sustainability (CGS)** Committee sets sustainability policies and oversees their company-wide implementation. It advises management and develops transparent operational guidelines that align with GC's principles of good corporate governance and sustainable development. By balancing environmental, social, and governance (ESG) considerations, the CGS supports long-term value creation, sustainable growth, and stakeholder confidence. The committee reports directly to the Board of Directors and regularly evaluates climate-related matters—such as energy efficiency, alternative raw-material sourcing, greenhouse-gas (GHG) mitigation measures, and GHG-reduction targets. In addition, CGS is informed of climate-related risks and opportunities through CGS meeting on a quarterly basis.
Risk Management Committee[23] (RMC)	The **Risk Management Committee (RMC)** reviews and approves risk-management policies to ensure they align with GC's objectives, strategic targets, risk appetite, and overall risk-management framework for the entire Group. It establishes the processes for identifying, prioritizing, and mitigating key risks—paying particular attention to early-warning indicators and emerging threats that could affect GC's operations. The RMC also monitors the effectiveness of mitigation measures and provides opinions and recommendations on investment projects or legally binding matters that are complex or could significantly affect the Company's reputation. In addition, the Committee ensures that all business activities comply with applicable laws and standards. The **Board of Directors (BoD)** oversees the corporate risk-management program, reviews the RMC's performance at least quarterly, and reports the results to shareholders through the GC One Report. Climate-related risks are fully integrated into the RMC's policies and practices: the Committee regularly evaluates both internal and external climate factors that could affect strategic objectives and confirms that appropriate, business-relevant measures to address climate change are in place.

[21] PTTGC (2025) For more details, please see Roles, Duties and Responsibilities of the Board of Directors, https://www.pttgcgroup.com/en/leadership/board-of-directors/roles-duties-and-responsibilities-of-the-board-of-directors

[22] PTTGC (2022) For more details, please see Corporate Governance and Sustainability Committee Charter, https://www.pttgcgroup.com/storage/document/cg-charter/20220310-pttgc-cg-charter-en.pdf

[23] PTTGC (2018) For more details, please see Risk Management Committee Charter, https://www.pttgcgroup.com/storage/document/cg-charter/20181220-pttgc-risk-charter-en.pdf

Table 7-2 Roles and Responsibilities of Management Level

Management Level	Roles and Responsibility
Management & Group Management Committee (MC & GMC)	To ensure efficient organizational management and operations that adhere to the policies and directions established by the Board of Directors, the Chief Executive Officer, exercising the power vested in him by GC's Articles of Association, has formed the Management Committee (MC) and the Group Management Committee (GMC). Both committees are composed of top management from Senior Vice President upwards, under the CEO's direct supervision. The CEO, as head of the Company's employees, has the authority and duties to ensure that the Company operates according to the policies, plans, and budgets approved by the Board. The MC is responsible for devising and aligning company's operational directions and guidelines with the Board's established policies. It reviews and offers suggestions on the Company's policies and operational guidelines in relation to marketing, commercial and supply; risk management, capital allocation and management; human resources management and development; quality, safety, occupational health, and environmental management; social responsibility; sustainable development; initiatives in pursuit of net-zero goals; as well as matters that may cause significant changes to its GC and Group Performance Centers. The MC also reviews and offers suggestions on Board meeting agenda prior to presenting them to the Board at the meeting. Additionally, the MC oversees the Company's compliance with the law and regulations of external regulatory authorities as well as its own rules and regulations and the Company's relevant legal actions to ensure that the conduct of GC's business is in compliance with good corporate governance principles and in conformity to international standards. The MC also follows up on and implements the Board's resolutions, suggestions, and opinions given at Board meetings as well as oversees and monitors diverse aspects of GC's progress as a whole and internationally. Meanwhile, the GMC is tasked with reviewing and offering opinions and recommendations on the alignment of Company policies with those of its Group Performance Centers in relation to the operational guidelines for Group Performance Centers' production management, marketing, commercial and supply, and risk management, including human resource management and development; quality, safety, occupational health, and environmental management; and social responsibility. It also monitors the performance of Group Performance Centers and progress on innovation and technology initiatives as well as projects that contribute to the efficiency of their operations. The MC holds at least three meetings monthly, while the GMC holds at least one monthly meeting. In 2024, the MC convened a total of 38 meetings, and GMC convened a total of 12 meetings. The Senior Vice President of Corporate Governance and Legal serves as Secretary to both committees.

Table 7-2 Roles and Responsibilities of Management Level (*Cont.*)

Management Level	Roles and Responsibility
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) Outlining and revising the measures, policies, strategies, and objectives regarding sustainable development and decarbonization for the organization and its partners to ensure operational congruence, which will result in a balance between environmental, social, and governance matters, while maintaining international standards of practice. (2) Determining plans, practical applications, and measurement systems for the operational integration required to achieve decarbonization and sustainable development on an organizational level. (3) Scrutinizing, monitoring, and making recommendations regarding decarbonization and sustainability to ensure both the short- and long-term objectives of the organization are met. (4) Managing, scrutinizing, giving approval and/or considering other aspects regarding investment projects for the organization and its partners in cases where investment returns are significantly impacted through the use of internal carbon pricing. (5) Giving approval and/or making recommendations on crucial issues surrounding sustainability and the release of operational data related to said sustainability in accordance with service management principles and international standards of practice. (6) Supporting a working group to ensure integration of efforts to reduce the amount of greenhouse gases released by the organization in accordance with operational guidelines and objectives set forth by the company. (7) Providing adequate support and development to the administration of budgets, resources, and staff.
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.

7.2 Board Skills and Competencies

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. The following **table 7-3** presents relevant skills for each member in governing bodies:

Table 7-3 Governing Bodies Skill Matrix

Governing Body	Members	Relevant Skills			
		Energy Industry	Materials Industry	Sustainability[24]	Enterprise Risk Management
Board Chair	Mr. Predee Daochai	✓		✓	✓
Corporate Governance and Sustainability Committee (CGS)	General Nimit Suwannarat (Chairman of CGS)			✓	✓
	Mr. Patchara Anuntasilpa			✓	✓
	Police Colonel Dusadee Arayawuit			✓	✓
	Mr. Wim Rungwattanajinda			✓	✓
Risk Management Committee (RMC)	Mr. Grisada Boonrach (Chairman of RMC)	✓	✓	✓	✓
	Mr. Petai Mudtham	✓	✓	✓	✓
	Mr. Noppadol Pinsupa	✓	✓	✓	✓
	Mr. Cherdchai Boonchoochauy	✓	✓	✓	✓
	Mr. Narongsak Jivakanun	✓	✓	✓	✓

7.3 Climate-related Performance in incentive schemes

GC integrates climate-related performance into its executive and employee incentive schemes to align accountability with the company's sustainability and decarbonization goals. Linking compensation to climate-related metrics reinforces GC's commitment to managing transition and physical climate risks while driving progress toward its Net Zero target. These incentive mechanisms are designed to promote long-term value creation by encouraging responsible decision-making and ensuring that climate performance is a core consideration in business execution at all levels of the organization. The details of climate-related performance in incentive schemes are presented in **table 7-4** as follows:

[24] Sustainability skill includes climate change skill

Table 7-4 Climate-related Performance in incentive schemes

Levels	Performance Evaluation Criteria
Board Level	The Board of Directors has prescribed annual Board performance assessments to enable Directors to review their performance and review problems and obstacles during the year. Three types of performance assessment are performed, namely group assessment, self-assessment, and cross-assessment (assessing another Director). Furthermore, Board KPIs have been established according to the CG Code and S&P Global Corporate Sustainability Assessment (CSA) comprising 4 aspects, which are Corporate KPIs, the Board performance group assessment results, Directors' meeting attendance, and Directors' engagement during Board meetings. Additionally, group assessment and self-assessment have been prescribed for the Company's sub-committees, namely the Audit Committee, the Nomination and Remuneration Committee, the Corporate Governance and Sustainability Committee, and the Risk Management Committee. The assessment results and suggestions are subsequently presented to the Board of Directors and used to develop guidelines for optimizing the Board's performance in a tangible way. The assessment results are also disclosed in Form 56-1 One Report and used by the Nomination and Remuneration Committee as a factor in the determination of The Board of Directors' annual remuneration.
Management Level	The Company evaluates the performance of its Executives annually against the pre-determined Key Performance Indicators (KPIs). These include financial performance, implementation of long-term strategic goals, personal performance, the Company's performance and practices of other listed companies of a similar size in the same industry. The evaluation also takes into account their responsibilities, management development and overall economic conditions.
Employee Level	To ensure that performance assessment enhances the achievement of GC's goals, supports the learning and development and the performance improvement of individual employees, and promotes rewards and recognition, GC has integrated its performance assessment policies, beginning with establishing annual goals, performance monitoring during the year, and year-end assessment. Also, to make certain that the corporate goals are reflected on individual levels, Key Performance Indicators (KPIs) are cascaded from the company's goals to the top executives and further down to the subsequent levels, while KPI alignment is conducted within each function, and a review performance alignment is carried out internally to ensure the function is assessed to the same standard. Moreover, to ensure fairness and transparency, the company policy requires that employees and their supervisors meet for a performance check-in periodically to allow them to monitor their performance and obtain assistance regularly.

8. Strategy

Recognizing the increasing impact of climate change on business viability and long-term value creation, GC—one of the key players in the global chemical value chain—is committed to ensuring that its business strategy remains resilient and forward-looking in the face of a rapidly changing climate and regulatory environment. This section presents a comprehensive overview of the climate-related risks and opportunities that could reasonably be expected to affect GC's strategy, financial position, financial performance, and cash flows. It also outlines GC's proactive measures—both in adaptation and transition—to strengthen resilience and support sustainable long-term value creation.

8.1 Climate-related Risks and Opportunities

Aligned with the Paris Agreement's objective to limit global temperature rise to well below 2°C above pre-industrial levels and to pursue efforts to cap the increase at 1.5°C, GC has set Net Zero target by 2050 and established **Decarbonization Pathway**[25]**.** To drive this ambition, all relevant departments in GC collaboratively and continuously assess climate-related risks and opportunities. The insights gained are systematically integrated into our business strategy to ensure effective mitigation of, and adaptation to, climate-related impacts.

In 2024, to comply with the IFRS S2, GC conducted both physical and transition risk analyses covering the reporting entities included in its consolidated financial statements as of 31 December 2024. For the entities included in the assessment, please see Section 4.1 *Reporting Entity*. On the other hand, to oversee the possibility of physical risks throughout GC's value chain, GC also conducts climate-related risk assessments for upstream (suppliers) and downstream (customers) to ensure potential impacts are identified and mitigation preparations are in place.

In addition, GC identified four physical risks—extreme heat, riverine flood, drought, and water stress—that significantly impact its operations. After reviewing the previous year's transition risk assessment, GC concluded that carbon pricing remains a material risk. Additionally, regarding transition opportunities, GC expects sustainable products to become significant opportunities in the future. The following **table 8-1** presents a summary of the effects of the identified climate-related risks and opportunities that could reasonably be expected to affect GC's prospects, business activities, and value chain:

[25] PTTGC (2023) Decarbonization Pathway, https://sustainability.pttgcgroup.com/storage/document/net-zero/20211119-pttgc-gc-s-decarbonization-pathways.pdf

Table 8-1 The effect of climate-related risks and opportunities that could reasonably be expected to affect GC's prospects, business activities, and value chain

CRROs	Timeframe	Descriptions by timeframe	Impacted Business Activities and Value Chain
Physical Risks			
Extreme Heat	Short-term (Up to 2030)	Rising temperatures pose risks to worker health and productivity, increase energy consumption and operating costs due to higher cooling demands, and may cause minor inefficiencies in process equipment that affect production quality.	**Upstream:** ▪ Refinery and Shared Facilities ▪ Aromatics ▪ Olefins **Intermediates:** ▪ Ethylene Oxide and Derivatives ▪ Phenols ▪ Others Intermediates **Polymers and Chemicals:** ▪ Polymers ▪ Chemicals **Upstream (Supplier)** ▪ Feedstock ▪ Utilities (Electricity, Water)
	Medium-term (2031-2040)	High temperatures can accelerate equipment wear and lead to more frequent maintenance or premature failure and increasing costs. Additionally, elevated temperatures heighten the risk of fire and explosions due to increased chemical volatility, necessitating enhanced safety measures.	
	Long-term (2041-2050)	Persistent extreme heat may require fundamental changes to facility design, location, and core chemical processes, driving significant capital investment. Chronic heat stress could also shift global production patterns away from traditionally favorable regions. Additionally, escalating risks may lead to higher insurance premiums or make some risks uninsurable, affecting financial resilience.	
Riverine Flood	Short-term (Up to 2030)	Flood events can cause immediate operational disruptions, including temporary plant shutdowns, power outages, and supply chain delays due to inaccessible transportation routes. Minor equipment damage from water ingress may require urgent repairs, while emergency response efforts and lost production can lead to increased short-term costs.	**Service and Others:** ▪ Logistics, Jetty, Utilities, and Infrastructure ▪ Technical, Engineering, Plant Maintenance, Safety, Occupational Health, Environmental, and Security Businesses
	Medium-term (2031-2040)	Significant flooding can cause major damage to critical machines, equipment, infrastructure, leading to costly repairs and prolonged downtime. Environmental contamination from hazardous spills may result in medium-term cleanup expenses and regulatory liabilities. Extensive flood events can disrupt regional supply chains, affecting multiple stakeholders. Additionally, insurance premiums are likely to rise substantially, and coverage for flood-prone assets may become harder to secure.	
	Long-term (2041-2050)	Frequent and severe flooding may make current plant locations economically unsustainable or unsafe, requiring costly relocations or shutdowns. This can lead to permanent loss of skilled workers and negatively impact regional economies. The closure or movement of major petrochemical facilities may also cause significant social and economic disruption in local communities.	

Table 8-1 The effect of climate-related risks and opportunities that could reasonably be expected to affect GC's prospects, business activities, and value chain (*Cont.*)

CRROs	Timeframe	Descriptions by timeframe	Impacted Business Activities and Value Chain
Physical Risks			
Drought	Short-term (Up to 2030)	Drought may cause increased operating costs due to rising water prices, reduced cooling and production efficiency, and potential production curtailments from regulatory water use restrictions.	**Upstream:** ▪ Refinery and Shared Facilities ▪ Aromatics ▪ Olefins **Intermediates:** ▪ Ethylene Oxide and Derivatives ▪ Phenols ▪ Others Intermediates **Polymers and Chemicals:** ▪ Polymers ▪ Chemicals **Bio and Circularity:** ▪ Bioplastics and Biochemicals ▪ Post-consumer Recycled ▪ Value Added Oleochemicals **Downstream (Customers)**
	Medium-term (2031-2040)	Drought may cause significant production cuts or shutdowns, increased operating costs from alternative water sourcing and treatment, and degraded water quality requiring more intensive processing, which may affect process efficiency and product quality.	
	Long-term (2041-2050)	Drought may include threats to site viability, prompting potential relocation or asset divestment; strategic shifts toward less water-intensive products; and the need for significant capital investment in advanced water treatment and water-efficient technologies.	
Transition Risks			
Carbon Price	Short-term (Up to 2030)	Operating costs have increased due to mandatory carbon price mechanisms such as Carbon Tax or Emission Trading System (ETS). It may result in potential profit margin reductions if costs cannot be passed on, early-stage competitive disadvantages in export markets, greater compliance requirements for emissions reporting.	**Upstream:** ▪ Refinery and Shared Facilities ▪ Aromatics ▪ Olefins **Intermediates:** ▪ Ethylene Oxide and Derivatives ▪ Phenols ▪ Others Intermediates **Polymers and Chemicals:** ▪ Polymers ▪ Chemicals **Bio and Circularity:** ▪ Bioplastics and Biochemicals ▪ Post-consumer Recycled ▪ Value Added Oleochemicals **Downstream Customers**
	Medium-term (2031-2040)	Carbon pricing may significantly increase operating costs due to rising carbon tax rate and reduction in ETS free allowances, intensified export competition from lower-carbon products, shifting consumer demand toward low-carbon products, risk of stranded high-emission assets, and increased Scope 3 emissions costs passed down from carbon-impacted suppliers.	
	Long-term (2041-2050)	Increased carbon pricing driven by evolving climate policy, international agreement, and heightened regulatory ambition aim to achieved net zero target. These changes may result in higher carbon costs. In the long-term, impacts of increased carbon pricing include increasing operating costs, prohibitive costs for unabated emissions, requiring, and requiring a complete transformation to net-zero operations. Regulatory may penalize high-emission assets or restrict market access for high-carbon products. Carbon may become a costly liability, and significant investment in carbon capture and removal technologies will be critical for managing residual emissions.	

Table 8-1 The effect of climate-related risks and opportunities that could reasonably be expected to affect GC's prospects, business activities, and value chain (*Cont.*)

CRROs	Timeframe	Descriptions by timeframe	Impacted Business Activities and Value Chain
Transition Opportunities			
Sustainable Products ▪ Low Carbon Products ▪ Circular Products ▪ Bio Products	Short-term (Up to 2030)	Sustainable products may create higher operating costs from increased R&D. Key developments include greater energy efficiency, gradual integration of renewable energy, and process in circular economy practices – particularly in mechanical recycling and pilot initiatives in chemical recycling. Bio-based products are entering early commercialization, providing fossil-free alternatives for niche applications. Carbon capture and utilization (CCU) remains at the pilot stage, with captured CO_2 used mainly for basic chemicals or enhanced oil recovery.	**Polymers and Chemicals:** ▪ Chemicals **Bio and Circularity:** ▪ Bioplastics and Biochemicals ▪ Post-consumer Recycled
	Medium-term (2031-2040)	Market demand for sustainable products is growing. Low-carbon production, powered by renewable energy and green hydrogen, will become standard. Chemical recycling will scale commercially, enabling wider waste recovery, while circular product design becomes mainstream. Bio-based feedstocks will expand in diversity and scale, competing more effectively with fossil inputs. CCU will reach commercial deployment, with CO_2 used across more applications and supported by dedicated infrastructure.	
	Long-term (2041-2050)	The chemical sector will be fundamentally transformed, aligned with net-zero and circular economy goals. Operations will achieve near-complete decarbonization through renewable energy, green hydrogen, and advanced CCU, making them carbon-neutral or even carbon-negative. Circularity will be fully embedded, with products designed for reuse, advanced recycling, and digital systems managing global material flows. Bio-based feedstocks will dominate, driven by synthetic biology and sustainable sourcing. CCU, including direct air capture, will be fully integrated into production, providing a key carbon source for chemical synthesis.	

GC has determined a time horizon framework that aligns with global climate targets, national policy pathways, and its internal climate strategy to effectively assess and manage climate-related risks and opportunities. The selected timeframes reflect both the urgency of climate action and the long-term nature of industrial transformation, as outlined below:

Short-term (Up to 2030)

This period aligns with near-term policy and decarbonization milestones. The year 2030 marks a critical milestone under the Paris Agreement, as countries are expected to achieve their Nationally Determined Contributions (NDCs). GC has also set interim targets for 2030, including GHG emissions reduction goals. This timeframe captures transition risks associated with imminent regulatory changes—such as the Climate Change Act—and opportunities from early investments in low-carbon technologies and sustainable products.

Medium-term (2031-2040)

This period is expected to see the scaling of strategic technologies, particularly carbon capture and utilization (CCU) and renewable feedstocks. Regulatory environments are likely to evolve significantly to support the global transition toward a 1.5°C pathway. Additionally, growing sustainability awareness among consumers will drive market trends, creating opportunities for sustainable products and innovative business models.

Long-term (2041-2050)

This horizon corresponds with GC's target to achieve net zero GHG emissions (Scope 1 and 2) by 2050, in line with the global commitment under the Paris Agreement. During this period, more severe long-term physical risks from climate change are expected to emerge. These risks must be considered in infrastructure development, supply chain resilience, and resource planning to ensure long-term business sustainability.

GC recognized climate-related risks and opportunities introduce immense uncertainty. To comprehensively understand how different combinations of climate-related factors could impact GC's operations. Therefore, GC conducted climate scenario analyses using time horizons as defined above (see Section 8.2 *Climate Strategy and Resilience*). Moreover, GC conducted baseline physical analyses to evaluate its exposure to physical risks for the reporting year of 2024 to further prioritize and mitigate those risks. The results of the physical risk analyses are reported based on geographical locations as illustrated in **Figure 8-1** and **Table 8-2**.

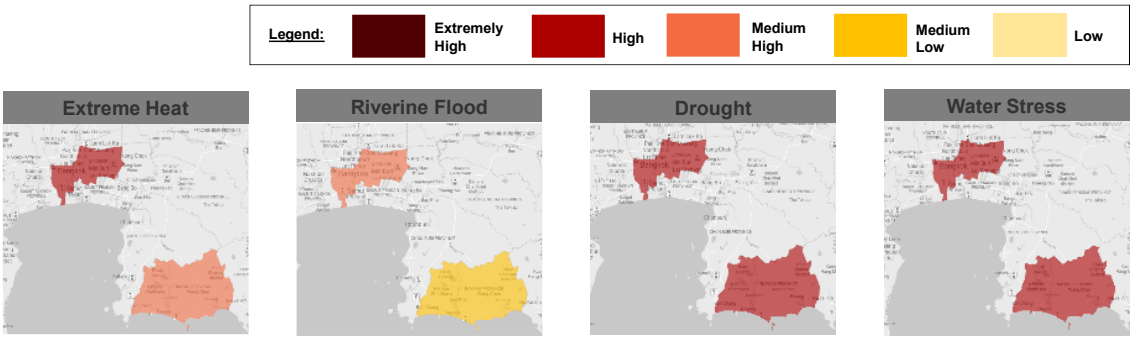


Figure 8-1 GC's physical risk exposure in domestic operations

Table 8-2 The results of physical baseline assessment

Legend:	Extremely High	High	Medium High	Medium Low	Low

Geographical Locations[26]	Number of Assets	Material Physical Risks			
		Extreme Heat	Riverine Flood	Drought	Water Stress
Domestic					
• Bangkok	7	High	Medium High	High	High
• Rayong	28	Medium High	Medium Low	High	High
• Downstream Customers	13[27]	Medium High	Medium Low	High	High
• Upstream Suppliers	3[27]	Medium High	Medium Low	High	High
International					
• Frankfurt	1	Medium High	Low	Medium High	High
• Ho Chi Minh	1	Medium High	High	Medium High	Medium Low
• Houston	4	High	High	Medium High	Medium High
• Jakarta	1	Medium High	Extremely High	High	High
• Rotterdam	1	Medium Low	Low	Medium High	Low
• Shanghai	1	High	High	High	Extremely High
• Singapore	1	Medium High	Medium Low	Medium High	Low
• Yangon	1	High	Extremely High	N/A[28]	Medium High

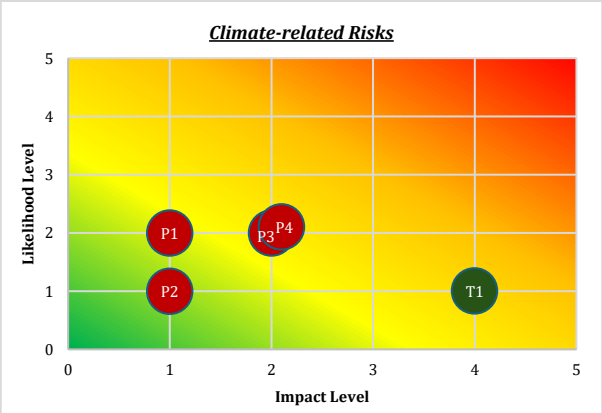
[26] Geographical locations are based on locations of operating assets included in the reporting entities as described in Section 4.1 *Reporting Entity*

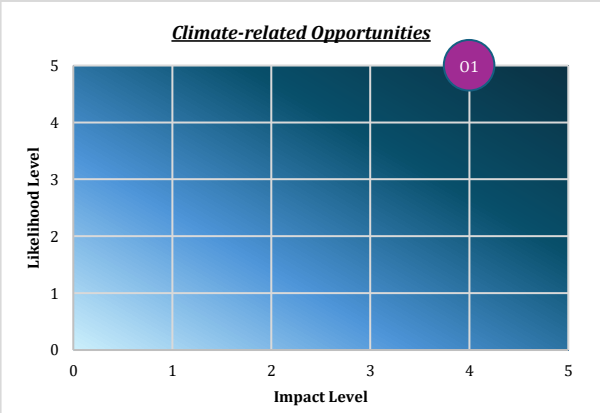
[27] In 2024, GC conducted a climate-related physical risk assessment for critical downstream customers (polymer), who contribute major revenue, and for critical upstream suppliers of feedstock and utilities (electricity and water). All assessed facilities are located in Rayong Province, Thailand—a region facing significant drought and water stress risks.

[28] Baseline assessment result of drought risk in Yangon is not available in Aqueduct Water Risk Atlas Tool

8.2 Climate Resilience

Addressing climate-related risks and opportunities is based on the urgency of those from risk prioritization. Identified climate-related risks and opportunities were prioritized based on GC's ERM Criteria (see Section 9.2.2 *Prioritizing climate-related risks and opportunities*). The results of climate-related risks and opportunities prioritization are presented in **Figure 8-2**. To demonstrate the ambition for addressing climate-related risks and opportunities, management has set up a context-specific strategic climate plan including several mitigation and adaptation actions covering 100% of both existing and new operations. Those mitigation and adaptation actions and their expenditure for the year 2024 are summarized in **table 8-3** below:





Physical Risk	P1	Extreme Heat
	P2	Riverine Flood
	P3	Drought
	P4	Water Stress
Transition Risk	T1	Carbon Price

Transition Opportunity	O1	Sustainable Products

Figure 8-2 Climate-related risks and opportunities probability map

Table 8-3 Summary of current mitigation and adaptation plans for the year 2024

CRROs	Current Mitigation and Adaptation Plans
Physical Risks	
Extreme Heat	In 2024, GC conducted health risk assessments for factory employees to evaluate potential hazards from exposure to extreme heat. The assessment was carried out in accordance with the Ministry of Industry's notification on industrial product standards: Guidelines for Health Examinations Based on Chemical and Physical Risk Factors from Occupational Exposure in Industrial Establishments (B.E. 2555/2012). The evaluation considered factors such as the duration and intensity of heat exposure, as well as light intensity. Based on the assessment results, GC adjusted employee work schedules to reduce heat exposure during shifts. In addition, the company communicated with employees about the importance of staying hydrated and ensured the provision of adequate beverages to support their health and safety during periods of excessive heat. GC also recognized that extreme heat contributes to increased energy costs due to higher demand for cooling systems. To address this, the company aimed to reduce energy consumption by improving energy efficiency and increasing the use of renewable energy. In 2024, GC implemented 93 new energy conservation projects, focusing on enhancing production efficiency through the application of innovation and technology. The company also promoted employee awareness to encourage responsible energy use and foster a corporate culture of energy conservation. Furthermore, GC expanded its solar energy initiatives. This included the installation of a 1.2 MW solar rooftop system at the Aromatics 2 Plant and a 0.6 MW floating solar system at the InnoPlus Solution Center. GC also collaborated with partners to develop 8 MW-equivalent floating solar pontoons to generate electricity for companies in the Eastern Seaboard Industrial Estate in Rayong Province. These pontoons are produced using InnoPlus high-density polyethylene (HDPE) pellets, which are used to manufacture SUNTARA™ floats—known for their exceptional strength and durability.
Riverine Flood	In 2024, GC implements a comprehensive flood risk management approach that combines both internal and external measures. Internally, the company focuses on prevention through regular sewer system surveys and maintenance ahead of the rainy season, as well as real-time site monitoring during periods of heavy rainfall. GC is also conducting studies to construct protective hard walls, using historical flood data—such as rainfall rates exceedingly twice the historical average of 130 mm—as the design basis. Additionally, plant infrastructure is being redesigned to accommodate peak historical rainfall rates. For mitigation, GC prepares sandbags and deploys mobile pumps to manage unexpected water accumulation. Externally, GC actively collaborates with the PTT Group and other key stakeholders through the Water War Room in Rayong. The company also works closely with the Map Ta Phut Plant Manager Club and engages with nearby communities to support watershed conservation efforts, enhancing regional resilience to flooding.

Table 8-3 Summary of current mitigation and adaptation plans for the year 2024 (*Cont.*)

CRROs	Current Mitigation and Adaptation Plans
Physical Risks	
Drought Water stress	In 2024, GC implements tangible water management practices across its operations to ensure the long-term sustainability of water resources. These efforts include water consumption planning based on the 3Rs principle—Reduce, Reuse, Recycle—and expanding the production capacity of the Wastewater Reverse Osmosis (WWRO) system. GC also aims to reduce dependence on natural freshwater sources by developing alternative water production solutions. Internally, key initiatives include the installation of a Mobile Seawater Reverse Osmosis (SWRO) unit at the refinery, the development of pipeline systems and wastewater recycling projects, and ongoing improvements to water-related infrastructure such as the WWRO system. Additionally, GC has secured water supply contracts, despite increased operational expenditure of approximately 8 million Baht per year at the refinery, to ensure resource availability under stressed conditions. Externally, GC collaborates with the PTT Group and other key stakeholders through the Water War Room in Rayong to coordinate regional water management efforts. It also partners with the Map Ta Phut Plant Manager Club, local communities to conserve watershed areas, and the Eastern Economic Corridor (EEC) to conduct a feasibility study for a large-scale SWRO facility with a production capacity of 200,000 liters per day. Furthermore, the possibility of investment from external parties is being explored to support the development of this SWRO facility.
Transition Risks	
Carbon Price	In 2024, GC has been conducting its business with a strong focus on climate-related risks, including the growing exposure to carbon price risk, which may impact operational costs and competitiveness as global and local carbon pricing mechanisms evolve. In response, GC is committed to achieving Net Zero emissions by 2050. The company emphasizes efficient and sustainable resource management based on Circular Economy principles, while integrating advanced technologies into its operations and fostering active stakeholder engagement. To mitigate carbon pricing risk, GC has developed a comprehensive Decarbonization Pathway comprising three key approaches: Efficiency-Driven, to optimize energy use and reduce emissions; Portfolio-Driven, to shift towards low-carbon and high-value businesses; and Compensation-Driven, to address residual emissions through measures such as carbon offsets and capture technologies. These initiatives form the foundation of GC's strategy to remain resilient and competitive in a low-carbon economy.
Transition Opportunities	
Sustainable Products	In 2024, GC conducted a review of sustainable product strategy and management as well as initiated the sustainable product management mechanism. GC focuses on developing eco-friendly products that use resources efficiently throughout the business chain by applying the principles of Product Stewardship, Eco-design, and Life Cycle Assessment, covering five key areas, namely Greenhouse Gas Emission, Sustainable Raw Materials, Product Circularity and Design, Energy Management, and Hazardous Material and Substances, to meet customer demands, create competitiveness and enable business growth in the long run while reducing future production costs. GC's products received environmental certifications, including Carbon Footprint of Product (CFP), Carbon Footprint Reduction (CFR), and Carbon Footprint of Circular Economy Product (CE-CFP) from the Thailand Greenhouse Gas Management Organization (TGO). GC also assesses direct and indirect water consumption and water efficiency in production processes, or water footprint, according to ISO 14046 while performing the Life Cycle Assessment according to ISO 14040 and ISO 14044.

Furthermore, GC conducted climate-related scenario analyses to assess its climate resilience by considering the potential impacts of material risks and emerging opportunities on its operations under a range of plausible future scenarios. To determine the scenarios used in the analysis, GC referred to both domestic and international peers, internationally recognized public scenarios developed by reputable organizations—including the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA)—as well as its own business context.

GC selected the Shared Socioeconomic Pathways (SSPs) for use in its physical scenario analyses. These scenarios, introduced in the IPCC's Sixth Assessment Report (AR6), incorporate more robust storylines covering macroeconomic factors such as population growth, urbanization, and technological advancements to mitigate climate change. Three different SSP levels were used to reflect best-case, business-as-usual, and worst-case scenarios in the physical risk assessments.

For transition scenario analyses, GC applied two public scenarios developed by the International Energy Agency (IEA): the Stated Policies Scenario (STEPS) and the Net Zero Emissions by 2050 Scenario (NZE2050). The STEPS scenario, which incorporates currently implemented and announced national climate policies and targets—such as NDC2.0 and NDC3.0—represents national emissions trajectory. In contrast, the NZE2050 scenario, aligned with the global commitment under the Paris Agreement, represents a low-emissions pathway. A summary of the scenarios used in the analyses is provided in **table 8-4**, while the outcomes of the analyses, including potential impacts on the Group's strategy and business model, as well as the corresponding mitigation and adaptation plans are summarized in **table 8-5**.

Table 8-4 Summary of scenarios applied for analyses

Scenarios		Description	Temperature Alignment	Timeframe
Physical Risks Scenarios				
Shared Socioeconomic Pathways (SSPs) – developed by the Intergovernmental Panel on Climate Change (IPCC)	SSP1-2.6	SSP1-2.6 represents a sustainable pathway with low challenges to mitigation and adaptation. It assumes strong climate action, with emissions peaking early and declining rapidly. This scenario is applied as best-case scenario for the analyses.	~1.8°C above pre-industrial levels by 2100.	Short-term (2030) Medium-term (2040) Long-term (2050)
	SSP2-4.5	SSP2-4.5 represents a "middle-of-the-road" scenario, where socioeconomic development follows historical patterns, and climate action is taken but not aggressively. Emissions peak around mid-century and then decline. This scenario is applied as a business-as-usual scenario for the analyses.	~2.7°C above pre-industrial levels by 2100.	
	SSP5-8.5	SSP5-8.5 represent a "fossil-fueled development" pathway with high challenges to mitigation and adaption. It assumes high economic growth driven by fossil fuels, with little climate action. This scenario is applied as the worst-case scenario for the analyses.	~4.4°C above pre-industrial levels by 2100.	

Table 8-4 Summary of scenarios applied for analyses (*Cont.*)

Scenarios		Description	Temperature Alignment	Timeframe
Transition Risks and Opportunities Scenarios				
IEA World Energy Outlook Scenarios – developed by the International Energy Agency (IEA)	Stated Policies (STEPS)	STEPS reflects current policy settings by evaluating sector-specific and country-specific policies currently in effect. It takes specific policies into account that are already implemented and those that have been announced by governments globally. In this case, the Group considers 2nd and 3rd Nationally Determined Contribution (NDC 2.0 and 3.0) as main assumptions for analyses.	~2.5°C above pre-industrial levels by 2100.	Short-term (2030) Medium-term (2040) Long-term (2050)
	Net Zero Emissions by 2050 (NZE2050)	NZE2050 reflects a clear pathway for the global energy sector to achieve net zero emissions by 2050. This strategy is designed to accomplish its objective without relying on emission reductions from sectors outside of energy. According to IPCC AR6, the reduction levels have been defined in 2 pathways: namely limit warming to 1.5°C with no or limited overshoot (1.5°C Pathway) and limit warming to 2°C (2°C Pathway).	~1.5°C above pre-industrial levels by 2100.	

Table 8-5 The outcome of scenario analyses, potential impacts on GC's strategy and business model, as well as its mitigation and adaptation strategies

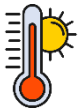
CRROs	Scenario	Timeframe	Impact Level	Description by scenarios	Potential Business Impacts	Anticipated Mitigation and Adaptation Strategies
Extreme Heat  **Vulnerable area** ***Domestic*** • Bangkok • Rayong ***International*** • All areas apart from Jakarta, Rotterdam, and Singapore	SSP1-2.6	Up to 2030 (Short-term)	Extremely High	• Moderate increase in the number of very hot days. • Cooling systems might still be challenged during peak events. • Worker safety protocols would need to be enhanced, but the scale of the challenge would be manageable.	**Short-term** *(less than five years)* • ***Worker Safety & Productivity:*** Increased risk of heat stress, heat exhaustion, and heatstroke for outdoor and even indoor workers in poorly cooled areas. This can lead to reduced productivity, increased absenteeism, and higher healthcare costs. • ***Increased Energy Consumption & Costs:*** Higher ambient temperatures necessitate increased cooling for process equipment, storage facilities, and buildings, leading to a significant surge in electricity demand and operational costs. • Minor Process Deviations: Slight reductions in the efficiency of cooling systems (e.g., cooling towers, heat exchangers), potentially causing minor fluctuations in reaction temperatures or product quality. **Medium-term** • ***Equipment Damage & Accelerated Wear:*** Prolonged exposure to high temperatures can degrade seals, gaskets, insulation, and electronic components, leading to increased maintenance frequency, premature equipment failure, and higher capital expenditure. • ***Increased Volatility & Fire/Explosion Risk:*** Higher temperatures increase the vapor pressure of volatile chemicals, raising the risk of fires and explosions, especially in storage tanks or during transfer operations, potentially requiring stricter hazardous area classifications. **Long-term** • ***Fundamental Design & Location Challenges:*** Persistent extreme heat may render current facility designs and locations unsuitable for economically viable chemical production. This could necessitate significant investments in entirely new cooling technologies, relocation of facilities, or fundamental redesign of chemical processes. • ***Shift in Global Production:*** Regions historically favorable for chemical production might become less attractive due to chronic heat stress, leading to a shift in global manufacturing hubs. • ***Increased Insurance Premiums & Uninsurable Risks:*** The frequency and severity of heat-related incidents could drive up insurance premiums or even render certain risks uninsurable.	**Short-term** *(less than five years)* • ***Work Schedule Adjustments:*** Implement staggered shifts, early morning/late evening work, longer breaks, and rotating tasks to minimize worker exposure during peak heat hours. • ***Enhanced Hydration & Rest:*** Provide readily accessible cool water and designated cooled rest areas for employees. • ***Emergency Response Plans:*** Develop and regularly drill emergency protocols for heat-related incidents (e.g., power outages, equipment overheating, worker heat emergencies). • ***Awareness Campaigns:*** Educate employees on the risks of heat stress, symptoms, and preventive measures. • ***Regular Health Checks:*** Implement regular health checks for workers in high-risk areas. **Medium-term** • ***Upgrade Cooling Systems:*** Invest in more efficient cooling towers, chillers, and heat exchangers. Consider technologies like adiabatic or hybrid cooling systems that are less water intensive. • ***Building Retrofits:*** Enhance building envelopes with improved insulation and reflective materials to minimize heat ingress • ***Advanced Controls & Automation:*** Deploy advanced process control systems that can dynamically adjust operations in response to real-time temperature fluctuations, maintaining stability and efficiency. • ***Technological Aids:*** Utilize wearable technology to monitor workers' physiological signs and alert them to heat stress risks. **Long-term** • ***Process Redesign for Heat Resilience:*** Research and develop new chemical processes that are less temperature-sensitive, operate at lower temperatures, or utilize alternative cooling methods (e.g., cryogenics where applicable, or novel heat sinks). • ***Material Selection:*** Use materials of construction for equipment that have higher thermal resistance and are less prone to degradation under extreme heat. • ***Strategic Site Selection:*** When planning new facilities or major expansions, prioritize locations with more favorable climate projections, lower ambient temperatures, and reliable access to cooling water. • ***Workforce Planning:*** Account for potential reductions in outdoor or high-heat work capacity in long-term workforce planning
		2031-2040 (Medium-term)	Extremely High			
		2041-2050 (Long-term)	Extremely High			
	SSP2-4.5	Up to 2030 (Short-term)	Extremely High	• More frequent and intense heatwaves. • Cooling systems would require more frequent maintenance and potential upgrades. • Increase risk of heat-related illness among employees, necessitating robust heat management plans.		
		2031-2040 (Medium-term)	Extremely High			
		2041-2050 (Long-term)	Extremely High			
	SSP5-8.5	Up to 2030 (Short-term)	Extremely High	• Severe and widespread impacts. • Cooling systems would be severely strained, potentially requiring complete redesign and massive investment. • High likelihood of frequent and prolonged production shutdowns due to thermal limits or worker safety.		
		2031-2040 (Medium-term)	Extremely High			
		2041-2050 (Long-term)	Extremely High			

Table 8-5 The outcome of scenario analyses, potential impacts on GC's strategy and business model, as well as its mitigation and adaptation strategies (*Cont.*)

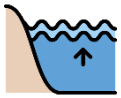
CRROs	Scenario	Timeframe	Impact Level	Description by scenarios	Potential Business Impacts	Anticipated Mitigation and Adaptation Strategies
Riverine Flood  **Vulnerable area** ***Domestic*** • Bangkok ***International*** • All areas apart from Houston, Jakarta, and Saint Priest	SSP1-2.6	Up to 2030 (Short-term)	High	• Occasional, more intense flood events requiring robust emergency response plans. • Existing flood defenses might need minor reinforcement. • Low risk of large-scale, catastrophic events. However, assets in flood-prone areas would need to maintain good flood preparedness.	**Short-term** *(less than five years)* • ***Operational Disruptions:*** Temporary plant shutdowns due to direct inundation, power outages, disruption of water supply/drainage, or inability of employees to reach the site. • ***Access & Logistics Issues:*** Roads, railways, and waterways leading to/from the plant become impassable, halting raw material deliveries and product shipments, leading to immediate supply chain bottlenecks. • ***Minor Equipment Damage:*** Water ingress into electrical systems, pumps, and control rooms can cause short circuits and malfunctions, requiring immediate repairs. • ***Increased Costs:*** Immediate costs associated with emergency response, temporary repairs, and production losses. **Medium-term** • ***Major Infrastructure Damage:*** Substantial damage to critical infrastructure such as storage tanks (displacement or rupture), pipelines, reactors, control systems, and foundations due to direct floodwaters, debris impact, or erosion. • ***Environmental Contamination:*** Widespread release of hazardous chemicals, oils, and waste into rivers, soil, and groundwater. This can contaminate drinking water sources, agricultural land, and ecosystems, leading to long-term clean-up costs and environmental liabilities • ***Supply Chain Collapse:*** Major regional flooding can cripple entire supply chains, affecting not only the immediate plant but also upstream suppliers and downstream customers. **Long-term** • ***Unviable Locations:*** Increased frequency and intensity of floods may render existing plant locations economically unviable or pose unacceptable environmental and safety risks, necessitating costly relocation or even decommissioning. • ***Loss of Human Capital:*** Permanent loss of skilled workforce if facilities are closed or relocated, impacting regional economies and specialized knowledge. • ***Societal Disruption:*** Chemical companies are often significant employers and contributors to local economies. Their closure or relocation due to flood risk can have severe socio-economic consequences for surrounding communities.	**Short-term** *(less than five years)* • ***Operational Disruptions:*** Temporary plant shutdowns due to direct inundation, power outages, disruption of water supply/drainage, or inability of employees to reach the site. • ***Access & Logistics Issues:*** Roads, railways, and waterways leading to/from the plant become impassable, halting raw material deliveries and product shipments, leading to immediate supply chain bottlenecks. • ***Minor Equipment Damage:*** Water ingress into electrical systems, pumps, and control rooms can cause short circuits and malfunctions, requiring immediate repairs. • ***Increased Costs:*** Immediate costs associated with emergency response, temporary repairs, and production losses. **Medium-term** • ***Business Continuity Planning (BCP):*** Develop comprehensive BCPs that address flood-related disruptions, and data recovery plans. • ***Spill Prevention & Containment:*** Ensure robust spill prevention and containment measures are in place, including secondary containment around tanks and effective emergency drains. • ***Permanent Flood Barriers:*** Construct permanent floodwalls, levees, and bunds around the perimeter of the plant, critical areas, and hazardous material storage tanks. • ***Chemical Inventory Management:*** Reduce on-site inventory of hazardous materials, especially in flood-prone areas, and store them securely above anticipated flood levels. • ***Training & Awareness:*** Provide regular training for all employees on flood risks, emergency procedures, and safe handling of chemicals during and after flood events. **Long-term** • ***Land Raising:*** Implement significant land raising projects for the entire site or critical sections where feasible and environmentally sound. • ***Relocation:*** For highly vulnerable sites, consider strategic, planned relocation to less flood-prone areas, especially for new facilities or major expansions. • ***Risk-Informed Land Use Planning:*** Integrate flood risk assessments into long-term strategic planning for facility siting and expansion. Avoid developing in high-risk floodplains.
		2031-2040 (Medium-term)	Medium High			
		2041-2050 (Long-term)	Medium Low			
	SSP2-4.5	Up to 2030 (Short-term)	Medium Low	• Increased frequency of damaging floods, potentially exceeding historical flood levels. • Greater risk to chemical storage, requiring substantial upgrades to flood defenses and site elevation. • Higher potential for hazardous material releases and prolonged operational downtime.		
		2031-2040 (Medium-term)	Medium Low			
		2041-2050 (Long-term)	Medium Low			
	SSP5-8.5	Up to 2030 (Short-term)	Medium Low	• Catastrophic and frequent flooding, potentially rendering some existing sites untenable. • High probability of significant chemical releases and long-term environmental contamination. • Extensive and costly damage to major infrastructure leading to fundamental redesign and relocation.		
		2031-2040 (Medium-term)	Medium Low			
		2041-2050 (Long-term)	High			

Table 8-5 The outcome of scenario analyses, potential impacts on GC's strategy and business model, as well as its mitigation and adaptation strategies (*Cont.*)

CRROs	Scenario	Timeframe	Impact Level	Description by scenarios	Potential Business Impacts	Anticipated Mitigation and Adaptation Strategies
Drought **Vulnerable area** ***Domestic*** • Bangkok • Rayong ***International*** • All areas apart from Ho Chi Minh, Shanghai, and Yangon	SSP1-2.6	Up to 2030 (Short-term)	Medium High	• Occasional, manageable water supply challenges. • GC would need to implement basic water conservation measures and optimize existing water use. • Risk of minor, temporary production impacts during dry spells.	**Short-term** *(less than five years)* • ***Water Use Restrictions:*** Local or regional authorities may impose mandatory water use restrictions, forcing companies to reduce non-essential water consumption or even curtail production. • ***Increased Water Costs:*** As water becomes scarcer, its price may increase, directly impacting operational expenditures. • ***Reduced Cooling Efficiency:*** Insufficient water supply for cooling towers or processes can lead to higher operating temperatures, potentially reducing efficiency and requiring adjustments to production rates. • ***Increased Energy Costs:*** Drought conditions often coincide with heatwaves, increasing demand for electricity for cooling. **Medium-term** • ***Production Cuts or Shutdowns:*** Prolonged and severe droughts can lead to significant water shortages, forcing major production cuts or even temporary shutdowns of water-intensive operations. • ***Higher Operational Costs:*** Continued increases in water prices, combined with the need for more expensive water treatment or water acquisition, will significantly raise operational costs. • ***Degraded Water Quality:*** Drought can concentrate pollutants in remaining water bodies, leading to poorer raw water quality. This requires more intensive and costly water treatment before it can be used in sensitive chemical processes. **Long-term** • ***Site Viability Issues:*** Chronic water scarcity may render certain manufacturing sites economically unsustainable or environmentally irresponsible, potentially forcing costly relocation or divestment of assets. • ***Strategic Shifts in Product Portfolios:*** Companies may need to re-evaluate their product portfolios, prioritizing less water-intensive chemicals or developing new processes that significantly reduce water dependency. • ***Significant Capital Investment:*** Major investments in advanced water treatment, desalination plants, or the development of entirely new, water-efficient production technologies will be required.	**Short-term** *(less than five years)* • ***Water Audits:*** Conduct comprehensive water audits to identify all water use points, quantify consumption, and pinpoint areas for immediate reduction. • ***Leak Detection & Repair:*** Implement aggressive leak detection and repair programs for all water infrastructure (pipes, valves, tanks). • ***Groundwater Monitoring:*** Monitor groundwater levels and quality to ensure sustainable extraction, if applicable. • ***Drought Monitoring & Early Warning:*** Implement real-time monitoring of local and regional drought indicators (precipitation, reservoir levels, groundwater tables) and subscribe to early warning systems. • ***Optimize Non-Process Water Use:*** Reduce water consumption in non-critical areas like landscaping, cleaning, and sanitary facilities. • ***Employee Awareness:*** Launch internal campaigns to educate employees on water conservation best practices. **Medium-term** • ***Water Risk Assessment:*** Integrate drought risk into comprehensive climate risk assessments, mapping vulnerabilities across the entire value chain (raw materials, production, logistics). • ***Water Recycling & Reuse:*** Implement closed-loop systems for process water, increasing the recycling and reuse of cooling water and treated wastewater within the plant. • ***Rainwater Harvesting:*** Install systems to collect and store rainwater for non-potable uses. • ***Greywater Recycling:*** Implement systems to collect and treat greywater from facility operations for suitable reuse. • ***Community Engagement & Collaboration:*** Engage proactively with local water authorities, communities, and other major water users to participate in regional water management planning and foster shared solutions. **Long-term** • ***Zero Liquid Discharge (ZLD):*** Aim for Zero Liquid Discharge (ZLD) systems where economically and technologically feasible, treating all wastewater to recover usable water and solids, eliminating liquid waste. • ***Desalination:*** Invest in or partner on desalination plants for coastal or brackish water sources, especially for critical, high-value processes.
		2031-2040 (Medium-term)	Medium High			
		2041-2050 (Long-term)	Medium High			
	SSP2-4.5	Up to 2030 (Short-term)	Medium High	• Regular and more severe water shortages impacting operations. • Need for significant investment in water recycling, reuse technologies, and diversification of water sources. • Increased risk of mandatory water restrictions, impacting production schedules and profitability.		
		2031-2040 (Medium-term)	Medium High			
		2041-2050 (Long-term)	Medium High			
	SSP5-8.5	Up to 2030 (Short-term)	Medium High	• Regular and more severe water shortages impact operations. • Need for significant investment in water recycling, reuse technologies, and diversification of water sources. • Increased risk of mandatory water restrictions, impacting production schedules and profitability.		
		2031-2040 (Medium-term)	Medium High			
		2041-2050 (Long-term)	Medium High			

Table 8-5 The outcome of scenario analyses, potential impacts on GC's strategy and business model, as well as its mitigation and adaptation strategies (*Cont.*)

CRROs	Scenario	Timeframe	Impact Level	Description by scenarios	Potential Business Impacts	Anticipated Mitigation and Adaptation Strategies
Water Stress **Vulnerable area** ***Domestic*** • Bangkok • Rayong ***International*** • Frankfurt • Jakarta • Shanghai	SSP1-2.6	Up to 2030 (Short-term)	High	• Regular and more severe water shortages impacting operations. • Need for significant investment in water recycling, reuse technologies, and diversification of water sources. • Increased risk of mandatory water restrictions, impacting production schedules and profitability.	**Short-term** *(less than five years)* • ***Production Cuts and operational disruptions:*** immediate and severe impacts from reduced water availability or quality can lead to slowdowns or even temporary shutdowns of production facilities, especially in water-intensive operations. • ***Increased Water Costs:*** As water becomes scarcer, its price may increase, directly impacting operational expenditures. • ***Social License to Operate:*** Local communities experiencing water scarcity may view large industrial water users negatively, leading to conflicts and reputational damage. **Medium-term** • ***Limited Expansion & Investment Constraints:*** Water stress can hinder plans for facility expansion or new plant construction in affected regions. • ***Increased Capital Expenditure:*** Significant investments may be required for new water treatment technologies, recycling systems, and alternative water sources. • ***Legal and Compliance Risks:*** Growing regulations imposing stricter water withdrawal limits, discharge quality standards, and reporting requirements and potential water-related litigation from affected stakeholders. **Long-term** • ***Closure and Relocation:*** Facilities located in severely water-stressed areas may become economically unviable, potentially leading to permanent closure or necessitating the relocation of production to water-abundant regions—incurring significant costs and logistical challenges. • ***Reduced Competitiveness:*** Failing to adapt to water stress risks may lose market share to more water-resilient competitors.	**Short-term** *(less than five years)* • ***Water Audits:*** Conduct regular, detailed water audits to identify areas of high consumption, leaks, and inefficiencies within existing operations. • ***Process Optimization:*** Review and refine production processes to minimize water usage and maximize efficiency which include improving cooling tower efficiency (e.g., increasing cycles of concentration, preventing leaks and drift), or exploring air-cooling alternatives where feasible, ensuring optimal utilization of available resources. • ***Enhanced Wastewater Treatment:*** Upgrade existing wastewater treatment plants to meet or exceed discharge quality standards, reducing pollutant load on receiving water bodies. **Medium-term** • ***Closed-Loop Systems & Recycling:*** Implement systems to treat and reuse water within the plant for various processes. • ***Water-Efficient Technologies:*** Invest in new equipment and technologies designed for lower water consumption. • ***Alternative Water Sourcing:*** Rainwater harvesting or treated municipal wastewater Reuse • ***Local Community Engagement:*** Collaborate with local communities and other water users to understand their needs and contribute to sustainable water management in the shared watershed. **Long-term** • ***Zero Liquid Discharge:*** treat and reuse water internally, eliminating discharge to external water bodies. • ***Desalination:*** For coastal facilities, invest in desalination plants (Sea Water Reverse Osmosis - SWRO) to produce freshwater from seawater, though this is energy-intensive and costly. • ***Community-Level Water Quality Initiatives:*** Participate in or lead efforts to improve overall water quality in the shared watershed, benefiting both the company and the community.
		2031-2040 (Medium-term)	High			
		2041-2050 (Long-term)	High			
	SSP5-8.5	Up to 2030 (Short-term)	High	• Regular and more severe water shortages impacting operations. • Need for significant investment in water recycling, reuse technologies, and diversification of water sources. • Increased risk of mandatory water restrictions, impacting production schedules and profitability.		
		2031-2040 (Medium-term)	High			
		2041-2050 (Long-term)	High			

Table 8-5 The outcome of scenario analyses, potential impacts on GC's strategy and business model, as well as its mitigation and adaptation strategies (*Cont.*)

CRROs	Scenario	Timeframe	Impact Level	Description by scenarios	Potential Business Impacts	Anticipated Mitigation and Adaptation Strategies
Carbon Price **Vulnerable area** ***Upstream:*** • Refinery and Shared Facilities • Aromatics • Olefins ***Intermediates:*** • Ethylene Oxide and Derivatives • Phenols • Others Intermediates ***Polymers and Chemicals:*** • Polymers • Chemicals ***Bio and Circularity:*** • Bioplastics and Biochemicals • Post-consumer Recycled • Value Added Oleochemicals	STEPS (NDC2.0)	Up to 2030 (Short-term)	Medium High	High likelihood of carbon tax expansion to broader fossil fuel and potentially direct industrial emissions, with the rate potentially increasing from the initial 200 baht per ton CO2e.	**Short-term** *(less than five years)* • ***Increased Operational Costs & Margin Compression:*** As Thailand's carbon pricing mechanisms become formalized, GC will face higher production costs for energy-intensive petrochemical processes, decreasing in profit margins, especially for commodity products where price flexibility is limited. • ***Competitive Disadvantage in Export Markets:*** Since EU's CBAM has been introduced to likely penalize carbon-intensive imports, other countries, including the UK and Japan, are also introducing similar levies. This results in GC's products less competitive against those from regions with lower carbon footprints or more mature carbon pricing systems. **Medium-term** • ***Significant Restructuring of Cost Base:*** Carbon prices are projected to rise significantly leading to shift in GC's cost structure, with a higher proportion of costs allocated to carbon management and decarbonization. • ***Asset Impairment Risk:*** Existing high-carbon assets that cannot be economically retrofitted or converted to low-carbon operations risk becoming impaired – losing value and potentially being retired prematurely. • ***Increased Capital Expenditure:*** Substantial capital will be required for large-scale deployment of deep decarbonization technologies (e.g., commercial-scale CCU/S facilities, significant investments in green hydrogen production or import infrastructure, full-scale sustainable feedstock conversion plants). • ***Value Chain Scrutiny (Scope 3):*** Mandatory Scope 3 reporting will become more prevalent, and customers will increasingly demand full transparency on the embodied carbon of products from raw material to end-of-life. **Long-term** • ***Threat to Business Models:*** If GC could not achieve net-zero target, it will face insurmountable and lose all competitiveness. • ***Access to Capital & License to Operate:*** Investors will almost exclusively favor companies demonstrating clear pathways to net-zero, potentially restricting access to capital for carbon-intensive businesses. Public scrutiny and regulatory pressure may remove their social license to operate	**Short-term** *(less than five years)* • ***Aggressive Energy Efficiency Programs:*** Implement immediate, high-impact projects to reduce energy consumption across all plants (e.g., waste heat recovery, process optimization, equipment upgrades). • ***Renewable Energy Sourcing:*** Accelerate the transition to renewable electricity through Power Purchase Agreements (PPAs) or on-site renewable generation to reduce Scope 2 emissions. • ***Internal Carbon Pricing (ICP) Enforcement:*** Utilize and potentially raise the internal carbon price to drive behavioral change and prioritize investment in emission reduction projects. **Medium-term** • ***Large-Scale CCU/S Deployment:*** Invest in and operate commercial-scale Carbon Capture Utilization (CCU) projects to abate unavoidable process emissions and contribute to the circular economy. • ***Scale-Up Sustainable Product Portfolio:*** Rapidly expand the production of existing sustainable product lines and introduce new ones, making them a significant portion of the company's revenue. This involves substantial investment in dedicated bio-based or recycled feedstock processing facilities. • ***Design for Circularity & Reduced Embodied Carbon:*** Implement "eco-design" principles across the entire product portfolio. This means designing products from the outset to be more durable, recyclable, or biodegradable, directly reducing their lifecycle GHG emissions. For example, developing polymers specifically optimized for mechanical or chemical recycling. **Long-term** • ***Green Hydrogen Integration:*** Implement green hydrogen as a fuel source and chemical feedstock in relevant processes (e.g., ammonia production), reducing reliance on fossil fuels. • ***Strategic Partnerships:*** Forge stronger alliances across the value chain, from feedstock suppliers to customers and waste management companies, to enable circularity and collective decarbonization. • ***Achieve Net-Zero Operations:*** Fully implement all decarbonization technologies and strategies to reach net-zero emissions for Scope 1, 2, and significant portions of Scope 3, aligning with national and global targets.
		2031-2040 (Medium-term)	High	Carbon tax will be widely applied at higher rates, while a mandatory ETS will be fully operational for major industrial emitters with tightening caps and increasing auctioning of allowances.		
		2041-2050 (Long-term)	Extremely High	ETS caps would be near zero for many sectors with prices designed to incentivize residual abatement and carbon removal technologies.		
	NZE2050 (1.5C Pathway)	Up to 2030 (Short-term)	High	Carbon prices would be significantly higher than STEPS to enforce rapid decarbonization.		
		2031-2040 (Medium-term)	Extremely High	Carbon prices would be punitive designed to virtually eliminate unabated fossil fuel use in industry. Moreover, ETS caps would be extremely tight with little to no free allowances.		
		2041-2050 (Long-term)	Extremely High	Carbon prices would be at its highest primarily aimed at penalizing any residual emissions and incentivizing carbon removal technologies.		

Table 8-5 The outcome of scenario analyses, potential impacts on GC's strategy and business model, as well as its mitigation and adaptation strategies (*Cont.*)

Legend:	Extremely High	High	Medium High	Medium Low	Low

CRROs	Scenario	Timeframe	Impact Level	Description by scenarios	Potential Business Impacts	Anticipated Mitigation and Adaptation Strategies
Sustainable Products • Low Carbon Products, including Polymer, Chemicals, CCU • Circular, such as Design, Recycle • Bio Products, for example, Bio refinery, Bio-based, Polymers, and Biodegradable) **Aligned area** ***Polymers and Chemicals:*** • Polymers • Chemicals ***Bio and Circularity:*** • Bioplastics and Biochemicals • Post-consumer Recycled • Value Added Oleochemicals	STEPS (NDC2.0)	Up to 2030 (Short-term)	Medium High	▪ Domestic regulatory pressure begins for example, carbon tax, initial ETS phases, and voluntary EPR. ▪ Consumer awareness is growing but might not be willing to pay high price for sustainability premium. ▪ CCU projects might be in early pilot or demonstrate phases.	**Short-term** *(less than five years)* • ***Increased R&D and Capital Costs:*** Significant upfront investment required for developing and piloting new sustainable technologies and adapting existing infrastructure. • ***Emerging Market Opportunities & Reputational Risks:*** Growing consumer and brand owner demand for sustainable products creates new revenue streams, but inaction leads to negative public perception and loss of market share. • ***Regulatory Pressure & Carbon Pricing:*** Increasing governmental regulations and carbon pricing mechanisms will directly raise operational costs for high-emission processes and products, forcing a shift. **Medium-term** • ***Market Growth for Sustainable Products & Disruption of Traditional Models:*** Rapid expansion of the market for sustainable chemicals, leading to significant competitive advantages for adapted companies and potential obsolescence for those clinging to conventional fossil-based production. • ***Supply Chain Transformation & Infrastructure Needs:*** Establishment of more robust supply chains for recycled materials, biomass, and captured CO2, necessitating substantial investment in new collection, processing, and transportation infrastructure. **Long-term** • ***Dominance of Sustainable Chemistry & Net-Zero Operations:*** Sustainable products and processes become the industry norm, with a strong emphasis on achieving net-zero or even net-negative emissions across the entire value chain. • ***Emergence of New Market Segments & Value Chains:*** Development of entirely new industries and economic models centered on bio-circular materials, advanced CO2 utilization, and fully closed-loop systems, enabling innovation in other "hard-to-abate" sectors.	**Short-term** *(less than five years)* • ***Strategic R&D and Pilot Programs:*** Prioritize investment in R&D for breakthrough sustainable technologies and actively engage in pilot projects to test and de-risk new processes. • ***Collaborative Value Chain Development:*** Form strategic partnerships across the value chain to secure sustainable feedstocks and enable circular solutions. • ***Green Product Portfolio & LCA:*** Begin developing and marketing a portfolio of certified sustainable products and use Life Cycle Assessment (LCA) to demonstrate environmental benefits and inform product development. **Medium-term** • ***Industrial-Scale Deployment & Feedstock Diversification:*** Scale up production of sustainable chemicals from pilot to industrial levels, actively diversifying feedstocks to include a wider range of recycled and bio-based alternatives. • ***Integration of CCU & Circular Business Models:*** Broadly integrate Carbon Capture and Utilization (CCU) technologies into operations and implement mature circular business models (e.g., product-as-a-service, take-back schemes). **Long-term** • ***Design for Infinite Circularity & Systemic Transformation:*** Design products for perpetual use and reuse within fully closed-loop systems, driving systemic transformation across the entire chemical value chain, from raw material sourcing to end-of-life. • ***Continuous Disruptive Innovation & Global Governance:*** Foster a culture of continuous innovation to develop radical new technologies and business models, while actively shaping global governance and policy frameworks for a truly circular and low-carbon chemical economy.
		2031-2040 (Medium-term)	High	▪ Consumer demand for sustainable products continues to grow with high willingness to pay sustainability premium. ▪ CCU becomes larger-scale deployment strategies.		
		2041-2050 (Long-term)	Extremely High	▪ Sustainable products are crucial to meeting Thailand's Nationally Determined Contributions (NDC). ▪ Consumer awareness is maturing with a growing willingness to pay a premium for sustainability. ▪ CCU is a recognized tool for decarbonization generating significant cost savings from avoided carbon penalties.		
	NZE2050 (1.5C Pathway)	Up to 2030 (Short-term)	High	▪ Much stronger global carbon pricing and policy signals. ▪ Consumer demand for sustainable products becomes more mainstream, willing to pay a sustainability premium. ▪ CCU is economically attractive for reducing compliance costs.		
		2031-2040 (Medium-term)	Extremely High	▪ Global carbon prices are very high. ▪ Demand for low-carbon, circular products is mainstream and often mandated. ▪ CCU operations are extensive while capture CO2 will be utilized creating new products and revenue stream.		
		2041-2050 (Long-term)	Extremely High	▪ Global net-zero is largely achieved. ▪ Demand for fossil-based petrochemicals is significantly replaced by circular and bio-based alternatives. ▪ The utilization of captured CO2 would be a significant business segment, with a diverse range of products and mature supply chains.		

8.3 Climate Strategy

Considering the results of climate-related scenario analyses, GC has integrated these insights into its climate strategy to formulate a robust decarbonization pathway. The analyses provided critical insights into the potential impacts of both physical and transition climate risks across varying time horizons and emissions trajectories, guiding GC to prioritize a balanced and resilient approach. As a result, GC has developed its decarbonization pathway based on scenario considerations.

As a result, GC has formulated a decarbonization strategy to respond to scenario consideration comprising three key focuses in reducing GHG emissions, namely (1) Efficiency-driven, (2) Portfolio-driven, and (3) Compensation-driven. A summary of GC's decarbonization strategies is summarized as follows:

Efficiency-driven

GC has employed energy consumption reduction and decarbonization technologies in the production process. The company has also switched to renewable energy or low-carbon energy to minimize greenhouse gas emissions from production. Accordingly, all GC plants have achieved ISO 50001:2018 energy management system certification. In this regard, GC has implemented key projects such as Heat Recovery, Compressor Efficiency Optimization, and Biogas. **Figure 8-3** presents an overview of Efficiency-driven performance.

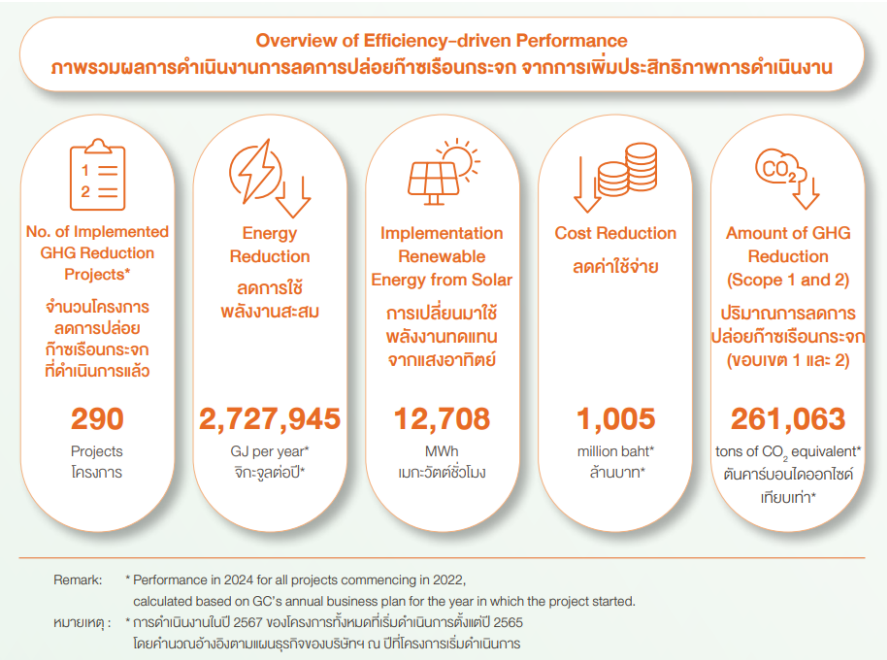


Figure 8-3 Overview of Efficiency-driven Performance

Portfolio-driven

GC has set the target to expand long-term adjusted EBITDA in the Specialty Chemicals and Bioplastics portfolios. GC has also altered investment in High Value-Low Carbon Business whereby GC aims to invest in bioplastics technology and innovation, recycled plastic and High Value Business (HVB) as well as the development of technology and innovation that support circular economy and product stewardship. The figure 8-4 presents an overview of Portfolio-driven performance.

Figure 8-4 Overview of Portfolio-driven Performance

Compensation-driven

GC has taken steps to manage residual emissions that remain after having executed Efficiency-driven and Portfolio-driven efforts. The company has developed and employed Carbon Capture and Storage (CCS) technology in tandem with other methods of carbon compensation, e.g., nature-based solutions by earning carbon credit through reforestation and forest care projects, and carbon credit purchase, etc., to support the transition to a sustainable economy and take part in the global effort to reach net zero emissions.

8.4 Capacity to adjust or adapt strategy and business model

GC's strategy and business model, along with its mitigation plans and actions, have been developed in response to different climate scenarios. The business-as-usual scenario (SSP2-4.5) was used to assess physical risks, while the STEPS scenario (aligned with Thailand's updated NDC 2.0) guided the analysis of transition risks and opportunities. To address these risks, GC implemented three core decarbonization strategies: Efficiency-driven, Portfolio-driven, and Compensation-driven approaches. These strategies serve as key mitigation and adaptation measures. Furthermore, GC evaluated the adequacy of each strategy under both scenarios across various time horizons to demonstrate its capacity to adjust and adapt its overall strategy and business model to climate change. A summary of this analysis is presented in table 8-6.

Table 8-6 Summary of GC's capacity to adjust or adapt its overall strategy and business model to climate change

CRROs	Scenarios	Timeframe	Decarbonization strategies	Impact on GC's strategy and business model
Physical risks				
Extreme Heat	SSP1-2.6 SSP2-4.5 SSP5-8.5	Up to 2030 (Short-term) 2031-2040 (Medium-term) 2041-2050 (Long-term)	***Efficiency-Driven:*** Enhancing production process efficiency by using technologies to lower energy consumption and shifting to renewable or low-carbon energy.	The decarbonization strategy is aligned with the results of the scenario analysis. The asset's design and efficiency improvements exceed the stress levels assumed in the scenario.
Riverine Flood	SSP1-2.6 SSP2-4.5 SSP5-8.5	Up to 2030 (Short-term) 2031-2040 (Medium-term) 2041-2050 (Long-term)	Not relevant to the decarbonization strategy due to the riverine flood's impact on other service-related businesses, which do not significantly contribute to GC's GHG emissions profile.	The core areas of the production site have low impact and a likelihood of being affected by riverine floods. However, office buildings and service businesses in Bangkok, which are more exposed to this risk, are located in rented areas. In the worst-case scenario, GC would need to find new office rental space—an outcome that would have an insignificant effect on operational expenses.
Drought	SSP1-2.6 SSP2-4.5 SSP5-8.5	Up to 2030 (Short-term) 2031-2040 (Medium-term) 2041-2050 (Long-term)	***Efficiency-Driven:*** Enhancing production process efficiency by using technologies to lower energy consumption and shifting to renewable or low-carbon energy. ***Portfolio-Driven:*** Adjusting investment in High Value Business (HVB), which focuses on the development of three business groups, namely: Specialty & Performance Chemicals, Bio-based Products, and Recycled Products. ***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.	GC's mitigation plan to cope with water shortages during dry spells exceeds the severity of the worst incidents in the past by 2–3 times. However, regular monitoring remains important, and adopting new technologies to improve water efficiency represents a sustainable form of mitigation.
Water Stress	SSP1-2.6 SSP5-8.5	Up to 2030 (Short-term) 2031-2040 (Medium-term) 2041-2050 (Long-term)		Local water management is crucial for stakeholder engagement and maintaining a license to operate. Participation in, and advocacy through, external water management committees serve as key monitoring channels for water situation forecasting, enhancing GC's operational management plans.

Table 8-6 Summary of GC's capacity to adjust or adapt its overall strategy and business model to climate change (*Cont.*)

Climate-related Risks and Opportunities	Scenarios	Timeframe	Decarbonization strategies	Impact on GC's strategy and business model
Transition risks				
Carbon Price	STEPS NZE2050	Up to 2030 (Short-term) 2031-2040 (Medium-term) 2041-2050 (Long-term)	***Efficiency-Driven:*** Enhancing production process efficiency by using technologies to lower energy consumption and shifting to renewable or low-carbon energy. ***Portfolio-Driven:*** Adjusting investment in High Value Business (HVB), which focuses on the development of three business groups, namely: Specialty & Performance Chemicals, Bio-based Products, and Recycled Products. ***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.	GC's GHG emissions management plans are now aligned with both domestic and international policies. However, some residual emissions remain that must be reduced to meet policy baselines by the 2040s. This requires GC to implement planned technologies and achieve its targeted initiatives.
Transition Opportunities				
Sustainable Products	STEPS NZE2050	Up to 2030 (Short-term) 2031-2040 (Medium-term) 2041-2050 (Long-term)	***Efficiency-Driven:*** Enhancing production process efficiency by using technologies to lower energy consumption and shifting to renewable or low-carbon energy. ***Portfolio-Driven:*** Adjusting investment in High Value Business (HVB), which focuses on the development of three business groups, namely: Specialty & Performance Chemicals, Bio-based Products, and Recycled Products. ***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.	With clearer regulatory directions supporting sustainable products both domestically and internationally, R&D will play a crucial role in developing new products and services that align with policy objectives and consumer demand.

8.5 Climate-related Risks and Opportunities Effects on Financial Position, Financial Performance and Cash Flows

GC recognizes climate-related risks and opportunities have financial implications on its own operations. To comprehensively understand impacts of climate-related risks and opportunities, GC has quantified the current and anticipated financial impacts of material climate-related risks—both physical and transition—as well as key transition opportunities across timeframe, to evaluate their effects on its financial position, financial performance, and cash flows.

When quantifying financial effects, a range of uncertainties and judgments must be considered. GC identifies the key factors influencing its financial position, performance, and cash flows by analyzing two primary perspectives:

1) Potential business impacts of climate-related risks and opportunities

These impacts may directly and indirectly affect GC's financial position, financial performance and cash flows, such as a reduction in asset value due to physical damage, increased environmental liabilities arising from legal cases, or financial losses from business disruptions caused by flooding.

2) Mitigation or adaptation strategies implemented in response to climate-related risks and opportunities

This perspective reflects GC's investments in initiatives aimed at reducing or managing climate-related impacts. Examples include investments in energy efficiency, permanent flood defenses, or the adoption of low-carbon technologies.

In addition, the financial effects of climate-related risks and opportunities are quantified for both current and anticipated impacts, based on defined time horizons as described in Section 8.*1 Climate-related Risks and Opportunities*. **Table 8-7 and table 8-8** presents GC's expected effects on its financial position, financial performance and cash flow over the short, medium and long-term.

Table 8-7 Financial impacts quantification of climate-related Physical risks and opportunities

CRROs	Impacted Transactions	Financial Aspects	Financial Effects[29] (Unit: Million Baht)				
			Current[30]	Scenarios	Short-term[31]	Medium-term[32]	Long-term[33]
Extreme Heat	Increased energy costs for cooling systems	Financial performance	No Financial Impact	SSP1-2.6	<0.01	<0.01	0.02
				SSP2-4.5	<0.01	0.02	0.08
				SSP5-8.5	<0.01	0.08	0.09
Riverine Flood	Increased temporary relocation costs	Financial performance	No Financial Impact	SSP1-2.6	No Financial Impact		
				SSP2-4.5	No Financial Impact		
				SSP5-8.5	No Financial Impact		
Drought/ Water Stress	Increased water utility costs	Financial performance	No Financial Impact	SSP1-2.6	No Impact	11	No Impact
				SSP2-4.5	19	24	No Impact
				SSP5-8.5	46	No Impact	29

29 The financial effects for climate-related risks and opportunities are disclosed in average per period.

30 Current financial effects are quantified for the period as of 31 December 2024.

31 Short-term financial effects are quantified for the year up to 2030.

32 Medium-term financial effects are quantified for the period 2031-2040.

33 Long-term financial effects are quantified for the period 2041-2050.

Table 8-8 Financial impacts quantification of climate-related Transition risks and opportunities

CRROs	Impacted Transactions	Financial Aspects	Financial Effects[34] (Unit: Million Baht)				
			Current[35]	Scenarios	Short-term[36]	Medium-term[37]	Long-term[38]
Carbon Price	Increased cost of inventory	Financial position	No Financial Impact	STEPS	No Financial Impact	49.83	231.69
	Increased intangible assets						
	Increased sales revenue	Financial performance					
	Increased cost of goods sold						
	Increased operating expenses						
Sustainable Products	Increased sales of sustainable products	Financial performance	114,006	STEPS	182,052	*During assessment*	
	R&D proportion of innovation contribution to GC's EBITDA	Financial performance	8.3% of EBITDA		10% of EBITDA	10% of EBITDA	10% of EBITDA

34 The financial effects for climate-related risks and opportunities are disclosed in average per period.
35 Current financial effects are quantified for the period as of 31 December 2024.
36 Short-term financial effects are quantified for the year up to 2030.
37 Medium-term financial effects are quantified for the period 2031-2040.
38 Long-term financial effects are quantified for the period 2041-2050.

9. Risk Management

9.1 Overview of Climate-related Risks and Opportunities Assessment

GC has conducted climate-related risks and opportunities assessments by utilizing the applicable public data regarding climate sciences and consulting with external experts. This public data provided by internationally recognized organizations, including The World Bank Group, The World Resources Institute (WRI), The International Energy Agency (IEA), is used as inputs for climate-related risks and opportunities assessment. The summary of inputs used for assessment is summarized in table 9-1 and table 9-2 as presented below:

Table 9-1 Inputs used for Physical Risk Assessment

Physical Risks	Assessment	Climate Drivers	Data Providers
Extreme Heat	Baseline	• Wet Bulb Globe Temperature (WBGT)	ThinkHazard!
	Scenario	• Number of Hot Days (>35C)	WORLD BANK GROUP
Riverine Flood	Baseline	• Riverine Flood Index	AQUEDUCT
	Scenario	• Precipitations	WORLD BANK GROUP
Drought	Baseline	• Drought Index	AQUEDUCT
	Scenario	• SPEI Drought Index	WORLD BANK GROUP
Water Stress	Both Baseline and Scenario	• Water Stress Index	AQUEDUCT

Table 9-2 Inputs used for Transition Risks and Opportunities

Data Providers	Descriptions
The International Energy Agency (IEA)	Scenarios such as the Stated Policies Scenario (STEPS) and the Net Zero Emissions by 2050 (NZE2050) scenario were used to estimate carbon pricing and assess the potential impacts on GC's business operations. In addition, datasets from the IEA's World Energy Outlook 2024 were used to identify potential drivers that may pose risks or present opportunities for GC.
The Department of Climate Change and Environment	The key governmental body tasked with developing and implementing Thailand's Climate Change Act plays a central role in establishing and managing carbon pricing mechanisms, which are used to assess GC's exposure to carbon pricing.
The Excise Department	The operational government agency is tasked with the implementation, collection, and enforcement of the carbon tax. In addition, it publicly announces the applicable carbon tax rate, which serves as the basis for estimating GC's carbon tax exposure.
McKinsey, SGA, others	Companies conducted the survey provided information regarding ESG which is used for anticipating sustainability trends to assess the magnitudes of risks and opportunities.

The scope of assessment is described in Section 4 *Reporting Boundary*, and climate scenarios used for assessment are described in Section 8.2 *Climate Strategy and Resilience.* GC defined the nature of climate-related risks and opportunities as mentioned in Section 8.1 *Climate-related Risks and Opportunities*. In addition, the likelihood and magnitude of the effects of those risks and opportunities are described in Section 9.2.2 *Prioritizing climate-related risks and opportunities*.

9.2 Process for Climate-related Risks and Opportunities Assessment

1) Identifying potential climate-related risks and opportunities

GC conducts an assessment of climate-related risks and opportunities (both physical and transition). The reporting entities covered in this report align with those included in GC's consolidated financial statements as of 31 December 2024 (see *Section 4.1, Reporting Entity*), representing 100% coverage of both existing and new operations. GC, in collaboration with external experts, conducted research to screen climate hazards related to climate change and identified nine key hazards: extreme heat, drought, water stress, water depletion, urban flood, riverine flood, coastal flood, lightning density, and cyclone. These hazards were included in the physical baseline assessment using publicly available data, as outlined in Section 3.1 *Overview of Climate-related Risks and Opportunities*, to determine material physical risks. Based on the results of the physical baseline assessment and the geographical locations of GC's operations, four material physical risks were identified: extreme heat, riverine flood, drought, and water stress, as presented in *Table A: Results of Physical Baseline Assessment*.

In parallel, GC assessed material transition risks by screening the key drivers exerting pressure to transition toward a low-carbon economy. These drivers include policy and legal developments (current and emerging regulations), market dynamics (market risks), technological advancements (technology risks), and reputational considerations (reputational risks). Among these, carbon pricing was identified as a material transition risk for GC. Additionally, GC examined sustainability trends, particularly the shift in consumer preferences, and identified its sustainable products as a significant transition opportunity. To demonstrate GC's climate resilience, scenario analysis was applied (see Section 8.2 *Climate Strategy and Resilience*) to assess the impacts of these risks and opportunities across the defined time horizons described in Section 2.1 *Climate-related Risks and Opportunities.*

2) Prioritizing climate-related risks and opportunities

After identifying climate-related risks and opportunities, GC prioritized them using its risk criteria matrix to evaluate both likelihood and impact magnitude. The comprehensive risk criteria matrix is illustrated in **Figure 9-1**. In terms of impact, GC classifies the severity into five levels: Severe (5), Major (4), Moderate (3), Minor (2), and Insignificant (1). For likelihood, GC also uses a five-level scale: Most Likely (5), Likely (4), Possible (3), Unlikely (2), and Rarely (1).

This risk matrix enables GC to effectively prioritize the identified climate-related risks and opportunities and to develop appropriate mitigation and adaptation strategies based on their likelihood and potential impact. The prioritization process was conducted with input from internal stakeholders who possess the relevant expertise and a comprehensive understanding of GC's business and strategic direction. The results of this process are presented in the heatmap in Section 8.1 *Climate-related Risks and Opportunities.*

Likelihood Level						
≥10%	Severe (5)	Significant	Significant	Critical	Critical	Critical
≥5-10%	Major (4)	Low	Significant	Significant	Critical	Critical
≥2-5%	Moderate (3)	Low	Low	Significant	Significant	Critical
≥0.5-2%	Minor (2)	Very Low	Low	Low	Significant	Significant
<0.5%	Insignificant (1)	Very Low	Very Low	Low	Low	Low
		Rarely (1)	Unlikely (2)	Possible (3)	Likely (4)	Most Likely (5)
		0-5%	≥5-10%	≥10-25%	≥25-50%	>50%
		Impact Level				

Figure 9-1 GC's Risk Matrix

3) Managing and Monitoring climate-related risks and opportunities

Based on the results of the climate-related risk and opportunity prioritization, GC has established mitigation and adaptation strategies to manage these risks and opportunities. The identified risks and opportunities are cascaded to executive members and operational functions to support decision-making and ensure the appropriateness of the strategies. The sufficiency of these mitigation and adaptation strategies is reviewed regularly on an annual basis. In addition, to proactively manage these risks and opportunities, relevant key performance indicators (KPIs) are established and assigned to key operational functions and employees. These KPIs are also reviewed annually to ensure the ongoing effectiveness of risk management efforts.

Furthermore, GC has adopted the Committee of Sponsoring Organizations of the Treadway Commission (COSO) ERM 2017 framework to integrate climate-related risks and opportunities into its enterprise risk management (ERM) process. This ensures a proactive approach to mitigating climate-related risks while leveraging opportunities arising from the transition toward a net-zero organization. Progress updates on sustainability-related and climate-related risks and opportunities are reported monthly to the Enterprise Risk Management Committee (ERMC), followed by the Management Committee (MC), chaired by the CEO. These updates are then submitted to the Risk Management Committee (RMC) on a quarterly basis for acknowledgment or approval. GC's overall enterprise risk management process is displayed in **figure 9-2** below.

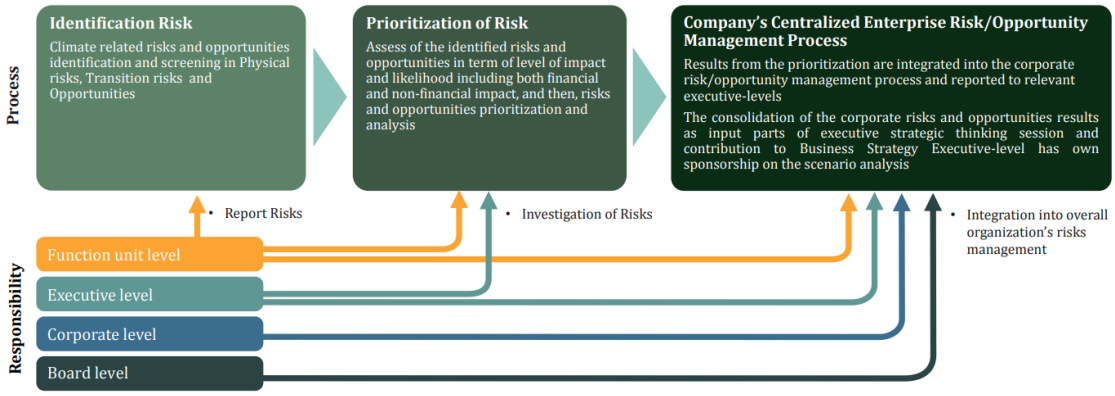


Figure 9-2 The Integration of process for identifying, assessing, and managing climate-related risks and opportunities into Enterprise Risk Management (ERM) process

10. Metrics and Targets

GC has voluntarily applied IFRS Sustainability Disclosure Standards using transition relief of climate-first reporting. Therefore, to align with IFRS S2 Climate-related Disclosure, GC discloses climate-related metrics and targets that provide insight into GC's exposure to, and management of, climate-related risks and opportunities. These disclosures are designed to support stakeholders in assessing GC's progress towards climate resilience and its strategic alignment with global decarbonization goals. Climate-related metrics disclosed are broken down into Cross-industry metrics (see Section 10.2.1 *Cross-industry Metrics*) and Industry-based metrics (see Section 10.2.2 *Industry-based Metrics*) for chemical sector. In addition, targets – such as emissions reduction goals – are established to reflect GC's commitment to achieving Net Zero Target by 2050, with progress tracked and reported regularly to ensure transparency and accountability.

10.1 Climate-related Targets

GC is committed to achieving net zero greenhouse gas (GHG) emissions for Scope 1 and Scope 2 by 2050, using 2021 as the base year. Interim milestones include a 20% reduction by 2030 and a 50% reduction of Scope 3 emission by 2050. These absolute targets apply to the entire organization under GC's operational control. The targets are aligned with the Paris Agreement and Thailand's national climate goals, supporting the global effort to limit temperature rise to below 2°C. GC focuses on emissions mitigation through improvements in production efficiency and a shift toward renewable and low-carbon energy sources.

To achieve its climate goals, GC employs a three-pronged strategy: Efficiency-Driven, Portfolio-Driven, and Compensation-Driven. Efficiency measures include enhancing production process performance and optimizing energy consumption. The portfolio approach involves investing in High Value Businesses such as bio-based, recycled, and specialty products that support long-term sustainability. Residual emissions are addressed through emerging solutions such as Carbon Capture, Utilization and Storage (CCUS) and nature-based initiatives. These strategic pillars reflect GC's circular economy principles and are central to its climate action plan, enabling the company to meet its net zero goal while maintaining operational excellence and long-term competitiveness.

In addition, 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. The following **Table 10-1** presents GC's GHG emissions performance in 2024 against the defined target in short-, medium-, and long-term.

Table 10-1 GHG Emissions Performance against the defined target

Metrics	Methodology to calculate metrics	Unit	Actual 2024	Target 2024[39]	Target by timeframe		
					Short-term	Medium-term	Long-term
GHG Emissions[40] for scope 1 & 2	Sum of Scope 1 & 2 GHG emissions	Million tons CO2e	7.83	8.96	Reduce 20% by 2030	n/a	Net Zero by 2050
GHG Emission intensity for scope 1 & 2	Sum of Scope 1 & 2 GHG emissions divided by ton production	kgCO2e per ton production	355.62	n/a	n/a	n/a	n/a

10.2 Climate-related Metrics

GC discloses climate-related metrics in accordance with IFRS S2, encompassing both Cross-industry and Industry-based metrics. These metrics offer a standardized view of GC's exposure to climate-related risks and opportunities, as well as its progress in managing them.

1) Cross-industry Metrics

Cross-industry metrics include GHG-related metrics covering Scope 1, 2 and material Scope 3 GHG emissions, details on assets or business activities vulnerable to climate-related risks and opportunities, the amount of capital expenditure, financing, or investment deployed towards climate-related risks and opportunities. Moreover, entities are required to explain whether and how a carbon price is applied in decision-making and to describe how climate-related considerations are incorporated into remuneration policies. The following section presents GC's Cross-industry metrics:

a) GHG Emissions and Performances

GC developed its GHG inventory in accordance with internationally recognized standards, including ISO 14064-1:2018; the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard - Revised Edition (WBCSD/WRI, 2004); the Compendium of Greenhouse Gas Emission Methodologies for the Oil and Natural Gas Industry (API, 2009); the IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006); and methodologies provided by the Thailand Greenhouse Gas Management Organization (Public Organization).

GC's GHG accounting approach is based on the Operational Control Approach (see Section 4.2 *Reporting Boundary for GHG emissions*). The GHG emissions metrics are presented in **Table 10-2** and **Table 10-3**.

[39] As of the reporting period, the entity's climate-related targets and methodologies have not been validated by an external third party. The organization is currently evaluating options for third-party validation as part of its roadmap to enhance credibility and transparency.

[40] 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)

Table 10-2 GHG Emissions by scope within GC in million tons CO_2- equivalent

Emission Scopes (as defined within ISO 14064-1:2006)	GHG Emissions (million tons CO_2 equivalent)			
	2021	2022	2023	2024
Direct GHG Emissions (scope 1)	6.52	6.14	6.13	6.17
Market-based energy indirect (scope 2)[41]	1.99	2.00	1.80	1.66
Location-based energy indirect (scope 2)[17]	2.03	2.00	1.79	1.85
Other relevant indirect GHG emission (scope 3)[42]	39.98	36.41	41.15	40.16
Total Emission (Scope 1 & 2 Market-based)	8.51	8.14	7.93	7.82

Table 10-3 Breakdown GHG emissions scope 3

Emission Scopes (as defined within ISO 14064-1:2006)		GHG Emissions (million tons CO_2 equivalent)			
		2021	2022	2023	2024
Other relevant indirect GHG emission (scope 3)[18]		39.98	36.41	41.15	40.16
Category 1:	Purchased goods and services (Raw material, Chemical, Catalyst, Packaging, and Service)	7.54	5.78	6.12	5.87
Category 2:	Capital goods	0.58	0.10	0.18	0.12
Category 3:	Fuel- and energy-related activities	1.02	0.97	1.17	1.28
Category 4:	Upstream transportation and distribution	0.57	0.55	0.65	0.58
Category 9:	Downstream transportation and distribution (Polymer product)	0.04	0.02	0.04	0.04
Category 10:	Processing of sold products (Polymer product)	3.39	3.38	3.43	3.61
Category 11:	Use of sold product	24.27	22.80	26.90	25.99
Category 12:	End-of-life treatment of sold product (Polymer product)	1.01	0.99	1.02	1.08
Category 15:	Investments (Thailand business)	1.57	1.82	1.63	1.59

b) Internal Carbon Price

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.

c) 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

[41] Energy indirect GHG emissions (Scope 2) refer to the amount emitted as a result of GC Group activities, although their emission sources are possessed or controlled by other companies. GC Group use Energy Indirect GHG Emissions (Scope2) (Market-based) as a target. Generally, they include emissions from electricity purchased and steam purchased (Location-based).

[42] Other indirect GHG emissions (Scope 3) refer to the amount indirect emissions which are a consequence of the activities of the GC Group, the significant emission is identified. The method of identification is considered by sizing, level of influence, risk, opportunity, sector guidance, outsourcing, and employee engagement. If the result of evaluation is more than 2.5 points, it is identified to be significant emission to report. 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.

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.

2) Industry-based Metrics

Providing more decision-useful information, IFRS S2 requires entities to disclose industry-specific metrics derived from SASB Standards. Therefore, GC – as key player in chemical industry – is required to disclose industry-based metrics as follows:

a) Additional GHG Emission Performance

According to **Table 10-2**, GC's Scope 1 GHG emissions were reported 6.17 million tons CO2 equivalent in 2024 as illustrated in **figure 10-1**, accounting for 12.86% of GC's total emissions, primarily from stationary fuel combustion sources in manufacturing facilities across Thailand.
As of now, Thailand does not have a specific law imposing a direct "cap" or "quota" on greenhouse gas emissions, unlike jurisdictions with cap-and-trade systems such as the EU ETS. Therefore, it assumes that **nearly 100% of GC's Scope 1 GHG emissions are regulated under relevant emissions-limiting laws**, including Thailand's national environmental and pollution control regulations, such as the Factory Act B.E. 2535. However, with the upcoming Climate Change Act potentially introducing mandatory carbon pricing or a cap-and-trade system, it will precisely determine the percentage of our Scope 1 GHG emissions covered under such emissions-limiting regulations[43].

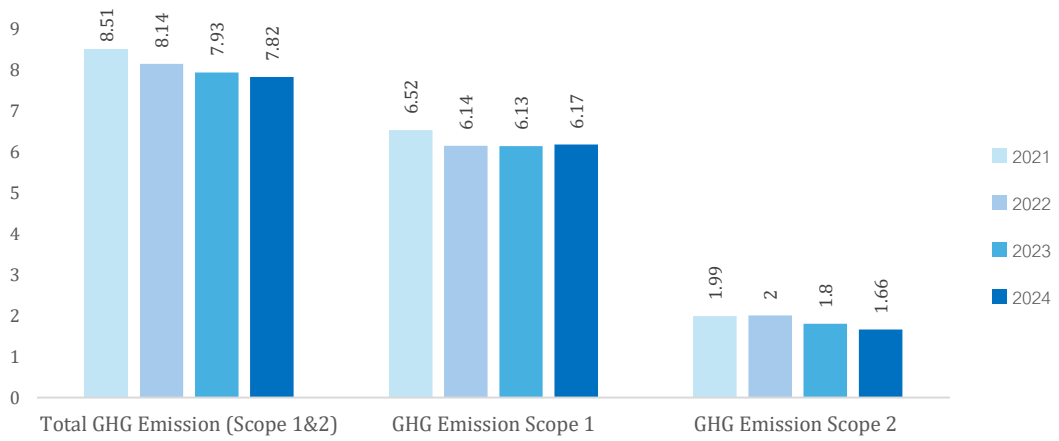


Figure 10-1 GC's total GHG Emissions (Million Ton CO_{2e})

[43] RT-CH-110a.1 – Gross global Scope 1 emissions, percentage covered under emissions-limiting regulation

In addition, GC is committed to achieving net zero Scope 1 and Scope 2 emissions by 2050, in alignment with the global goal of limiting average temperature rise to below 1.5 degrees Celsius, as well as Thailand's Long-term Low Greenhouse Gas Emission Development Strategy (LT-LEDS). As GC has established defined time horizons (see Section 8.1 *Climate-related Risks and Opportunities*), GHG emissions reduction targets have been set for 2030 (short-term horizon) and 2050 (long-term horizon). A medium-term target is currently under consideration and will be established in the near future (see **Table 10-1**). To support the achievement of these targets, the performance enhancement projects implemented by GC in 2024 were illustrated in **table 10-4**.

Table 10-4 Performance enhancement projects and their CO_2 emissions reduction per year

Performance enhancement projects	CO_2 Emissions Reduction per year
▪ Recovery Heat from Benzene Rundown, Heavy Aromatic Overhead to improve process efficiency	3,381 tons CO2 equivalent
▪ Gas Turbine Generator's Advance Gas Path (AGP) Improvement to minimize the GTG's energy consumption	6,608 tons CO2 equivalent
▪ Optimization Compressor by Tuning Surge Control Line by adjusting surge control value in the compressor system to enhance efficiency	3,641 tons CO2 equivalent
▪ Renewable Energy by Solar Energy and Biogas Project	20,457 tons CO2 equivalent

These above-mentioned projects resulted in a reduction of 58,078 tons of CO_2 equivalent, with an investment of 287 million Thai Baht and an estimated cost saving of 328 million Thai Baht[44].

b) Energy Management

Energy efficiency is a key component of GC's decarbonization strategy. As energy-intensive operations contribute significantly to both environmental impact and production costs, GC places strong emphasis on effective energy management across all manufacturing sites. In alignment with IFRS S2, and with reference to the SASB standard RT-CH-130a.1, GC tracks and discloses key energy-related metrics. These efforts support the company's commitment to reducing GHG emissions, optimizing resource use, and aligning with national energy efficiency targets as well as GC's net zero emissions goal by 2050. The energy-related metrics are presented in **Table 10-5**.

Table 10-5 Energy-related metrics

Topic	Code	Metrics	Unit	2021	2022	2023	2024
Energy Management	RT-CH-130a.1	Total energy consumed	Million MWh	43.16	36.88	39.30	36.41
		Percentage grid electricity	%	8.15	7.44	7.95	6.41
		Percentage renewable	%	0	0	0.02	0.03
		Total self-generated energy	Million MWh	19.43	18.33	21.02	19.56

[44] RT-CH-110a.2 – Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets

c) Water Management

Water management is a critical part of GC's commitment to environmental responsibility and sustainable operations. Given the importance of water in chemical production, GC focuses on efficient use, recycling, and discharge control. In alignment with IFRS S2, and with reference to the SASB standard RT-CH-140a.1 to RT-CH-140a.3, GC monitors and discloses key metrics such as water withdrawn, consumed, and discharged, along with operations in high water-stress areas. These metrics, shown in **Table 10-6**, reflect GC's dedication to responsible water stewardship and alignment with national and global sustainability goals.

Table 10-6 Water-related metrics

Topic	Code	Metrics	Unit	2021	2022	2023	2024
Water Management	RT-CH-140a.1	Total water withdrawn	Million m3	57.85	58.16	58.26	63.05
		Total water consumed	Million m3	41.40	41.90	42.44	45.19
		Percentage of each in regions with High or Extremely High Baseline Water Stress	%	0	0	0	0
	RT-CH-140a.2	Number of incidents of non-compliance associated with water quality permits, standards, and regulations	Case	0	0	0	0

According to material physical risks identified, drought risk and water stress risk are material water-related risks for GC (see Section 8.1 *Climate-related Risks and Opportunities*). To actively respond to those risks, GC conducted comprehensive risk assessment both baseline and scenario analyses to establish mitigation strategies to cope with those risks (see Section 8.2 *Climate Strategy and Resilience*)[45].

d) Activity Metric

To provide context for sustainability performance and enable year-over-year comparisons, GC discloses relevant activity metric in accordance with IFRS S2, and with reference to the SASB Standard RT-CH-000A. The metric includes total production volume which offers transparency in sustainability reporting. The activity metric is presented in **Table 10-7**.

Table 10-7 Activity metrics

Topic	Code	Metric	Unit	2021	2022	2023	2024
Activity Metric	RT-CH-000A	Total production volume	Million tons	21.01	20.20	21.67	21.99

[45] RT-CH-140a.3 – Description of water management risks and discussion of strategies and practices to mitigate those risks

10.3 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.

11. ISSB Index

Table 11-1 IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information

Topic	IFRS Index	Requirements	Location in Report
General Requirements	IFRS S1.54	In identifying sustainability-related risks and opportunities that could reasonably be expected to affect an entity's prospects, an entity shall apply IFRS Sustainability Disclosure Standards.	**Section 6** Materiality Assessment
	IFRS S1.55	In addition to IFRS Sustainability Disclosure Standards: (a) an entity shall refer to and consider the applicability of the disclosure topics in the SASB Standards. An entity might conclude that the disclosure topics in the SASB Standards are not applicable in the entity's circumstances. (b) an entity may refer to and consider the applicability.	**Section 2.1** Compliance with IFRS Sustainability Disclosure Standards
	IFRS S1.56	In identifying applicable disclosure requirements about a sustainability related risk or opportunity that could reasonably be expected to affect an entity's prospects, an entity shall apply the IFRS Sustainability Disclosure Standard that specifically applies to that sustainability-related risk or opportunity.	Additional guidance – no disclosure requirement
	IFRS S1.57	In the absence of an IFRS Sustainability Disclosure Standard that specifically applies to a sustainability-related risk or opportunity, an entity shall apply judgement to identify information that: (a) is relevant to the decision-making of users of general-purpose financial reports; and (b) faithfully represents that sustainability-related risk or opportunity.	Additional guidance – no disclosure requirement
	IFRS S1.59	An entity shall identify: (a) the specific standards, pronouncements, industry practice and other sources of guidance that the entity has applied in preparing its sustainability-related financial disclosures, including, if applicable, identifying the disclosure topics in the SASB Standards; and (b) the industry(s) specified in the IFRS Sustainability Disclosure Standards, the SASB Standards or other sources of guidance relating to a particular industry(s) that the entity has applied in preparing its sustainability-related financial disclosures, including in identifying applicable metrics.	**Section 2.1** Compliance with IFRS Sustainability Disclosure Standards **Section 2.3** First-time adoption of IFRS Sustainability Disclosure Standards and transitional reliefs

Table 11-1 IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (*Cont.*)

Topic	IFRS Index	Requirements	Location in Report
General Requirements (*Cont.*)	IFRS S1.63	Information required by an IFRS Sustainability Disclosure Standard may be included in sustainability-related financial disclosures by cross-reference to another report published by the entity. If an entity includes information by cross-reference, the entity shall apply the requirements in paragraphs B45–B47.	Additional guidance – no disclosure requirement
	IFRS S1.64	An entity shall report its sustainability-related financial disclosures at the same time as its related financial statements. The entity's sustainability-related financial disclosures shall cover the same reporting period as the related financial statements.	**Section 2.2** Alignment with financial statements
	IFRS S1.65	Normally, an entity prepares sustainability-related financial disclosures for a 12-month period. However, for practical reasons, some entities prefer to report, for example, for a 52-week period. This Standard does not preclude that practice.	Additional guidance – no disclosure requirement
	IFRS S1.66	When an entity changes the end of its reporting period and provides sustainability-related financial disclosures for a period longer or shorter than 12 months, it shall disclose: (a) the period covered by the sustainability-related financial disclosures; (b) the reason for using a longer or shorter period; and (c) the fact that the amounts disclosed in the sustainability-related financial disclosures are not entirely comparable.	Additional guidance – no disclosure requirement
	IFRS S1.67	If, after the end of the reporting period but before the date on which the sustainability-related financial disclosures are authorized for issue, an entity receives information about conditions that existed at the end of the reporting period, it shall update disclosures that relate to those conditions in the light of the new information.	Additional guidance – no disclosure requirement
	IFRS S1.68	An entity shall disclose information about transactions, other events and conditions that occur after the end of the reporting period, but before the date on which the sustainability-related financial disclosures are authorized for issue, if non-disclosure of that information could reasonably be expected to influence decisions that primary users of general-purpose financial reports make on the basis of those reports.	Additional guidance – no disclosure requirement

Table 11-1 IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (*Cont.*)

Topic	IFRS Index	Requirements	Location in Report
General Requirements (*Cont.*)	IFRS S1.69	This Standard does not mandate which entities would be required to provide interim sustainability-related financial disclosures, how frequently, or how soon after the end of an interim period. However, governments, securities regulators, stock exchanges and accountancy bodies may require entities whose debt or equity securities are publicly traded to publish interim general purpose financial reports. If an entity is required or elects to publish interim sustainability-related financial disclosures in accordance with IFRS Sustainability Disclosure Standards, the entity shall apply paragraph B48.	Additional guidance – no disclosure requirement
	IFRS S1.71	Amounts reported in sustainability-related financial disclosures might relate, for example, to metrics and targets or to current and anticipated financial effects of sustainability-related risks and opportunities.	**Section 2.2** Alignment with financial statements
	IFRS S1.72	An entity whose sustainability-related financial disclosures comply with all the requirements of IFRS Sustainability Disclosure Standards shall make an explicit and unreserved statement of compliance. An entity shall not describe sustainability-related financial disclosures as complying with IFRS Sustainability Disclosure Standards unless they comply with all the requirements of IFRS Sustainability Disclosure Standards.	**Section 2.1** Compliance with IFRS Sustainability Disclosure Standards
	IFRS S1.73	This Standard relieves an entity from disclosing information otherwise required by an IFRS Sustainability Disclosure Standard if law or regulation prohibits the entity from disclosing that information. This Standard also relieves an entity from disclosing information about a sustainability-related opportunity otherwise required by an IFRS Sustainability Disclosure Standard if that information is commercially sensitive as described in this Standard. An entity using these exemptions is not prevented from asserting compliance with IFRS Sustainability Disclosure Standards.	Additional guidance – no disclosure requirement

Table 11-1 IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (*Cont.*)

Topic	IFRS Index	Requirements	Location in Report
Judgments	IFRS S1.74	An entity shall disclose information to enable users of general-purpose financial reports to understand the judgements, apart from those involving estimations of amounts, that the entity has made in the process of preparing its sustainability-related financial disclosures and that have the most significant effect on the information included in those disclosures.	**Section 5** Judgements and measurement uncertainties
	IFRS S1.75	In the process of preparing sustainability-related financial disclosures, an entity makes various judgements, apart from those involving estimations, that can significantly affect the information reported in the entity's sustainability-related financial disclosures. For example, an entity makes judgements in: (a) identifying sustainability-related risks and opportunities that could be reasonably expected to affect the entity's prospects; (b) determining which sources of guidance to apply in accordance with paragraphs 54–58; (c) identifying material information to include in the sustainability-related financial disclosures; and (d) assessing whether an event or change in circumstances is significant and requires reassessment of the scope of all affected sustainability-related risks and opportunities throughout the entity's value chain.	**Section 5** Judgements and measurement uncertainties
	IFRS S1.76	Other IFRS Sustainability Disclosure Standards may require disclosure of some of the information that an entity would otherwise be required to disclose in accordance with paragraph 74.	Additional guidance – no disclosure requirement
Measurement Uncertainty	IFRS S1.77	An entity shall disclose information to enable users of general-purpose financial reports to understand the most significant uncertainties affecting the amounts reported in its sustainability-related financial disclosures.	**Section 5** Judgements and measurement uncertainties
	IFRS S1.78	An entity shall: (a) identify the amounts that it has disclosed that are subject to a high level of measurement uncertainty; and (b) in relation to each amount identified in paragraph 78(a)	**Section 5** Judgements and measurement uncertainties

Table 11-1 IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (*Cont.*)

Topic	IFRS Index	Requirements	Location in Report
Measurement Uncertainty (*Cont.*)	IFRS S1.79	When amounts reported in sustainability-related financial disclosures cannot be measured directly and can only be estimated, measurement uncertainty arises. In some cases, an estimate involves assumptions about possible future events with uncertain outcomes. The use of reasonable estimates is an essential part of preparing sustainability-related financial disclosures and does not undermine the usefulness of the information if the estimates are accurately described and explained. Even a high level of measurement uncertainty would not necessarily prevent such an estimate from providing useful information.	**Section 5** Judgements and measurement uncertainties
	IFRS S1.80	The requirement in paragraph 77 for an entity to disclose information about the uncertainties affecting the amounts reported in sustainability-related financial disclosures relates to the estimates that require the entity's most difficult, subjective or complex judgements. As the number of variables and assumptions increases, those judgements become more subjective and complex, and the uncertainty affecting the amounts reported in the sustainability-related financial disclosures increases accordingly.	Additional guidance – no disclosure requirement
	IFRS S1.81	The type and extent of the information an entity might need to disclose vary according to the nature of the amount reported in the sustainability-related financial disclosures—the sources of and the factors contributing to the uncertainty and other circumstances.	Additional guidance – no disclosure requirement
	IFRS S1.82	Other IFRS Sustainability Disclosure Standards may require disclosure of some of the information that an entity would otherwise be required to disclose in accordance with paragraphs 77–78.	Additional guidance – no disclosure requirement
Governance	IFRS S1.26	The objective of sustainability-related financial disclosures on governance is to enable users of general-purpose financial reports to understand the governance processes, controls and procedures an entity uses to monitor, manage and oversee sustainability-related risks and opportunities.	Requirement Objective – no disclosure requirement
	IFRS S1.27	To achieve this objective, an entity shall disclose information about: (a) the governance body(s) (which can include a board, committee or equivalent body charged with governance) or individual(s) responsible for oversight of sustainability-related risks and opportunities. (b) management's role in the governance processes, controls and procedures used to monitor, manage and oversee sustainability-related risks and opportunities.	**Section 7.1** Climate Governance Structure

Table 11-1 IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (*Cont.*)

Topic	IFRS Index	Requirements	Location in Report
Strategy	IFRS S1.28	The objective of sustainability-related financial disclosures on strategy is to enable users of general-purpose financial reports to understand an entity's strategy for managing sustainability-related risks and opportunities.	Requirement Objective – no disclosure requirement
	IFRS S1.38	An entity need not provide quantitative information about the current or anticipated financial effects of a sustainability-related risk or opportunity if the entity determines that: (a) those effects are not separately identifiable; or (b) the level of measurement uncertainty involved in estimating those effects is so high that the resulting quantitative information would not be useful.	Additional guidance – no disclosure requirement
	IFRS S1.39	In addition, an entity need not provide quantitative information about the anticipated financial effects of a sustainability-related risk or opportunity if the entity does not have the skills, capabilities or resources to provide that quantitative information.	Additional guidance – no disclosure requirement
	IFRS S1.42	Other IFRS Sustainability Disclosure Standards may specify the type of information an entity is required to disclose about its resilience to specific sustainability-related risks and how to prepare those disclosures, including whether a scenario analysis is required.	Additional guidance – no disclosure requirement
Risk Management	IFRS S1.43	The objective of sustainability-related financial disclosures on risk management is to enable users of general-purpose financial reports: (a) to understand an entity's processes to identify, assess, prioritize and monitor sustainability-related risks and opportunities, including whether and how those processes are integrated into and inform the entity's overall risk management process; and (b) to assess the entity's overall risk profile and its overall risk management process.	Requirement Objective – no disclosure requirement
	IFRS S1.44	To achieve this objective, an entity shall disclose information about: (a) the processes and related policies the entity uses to identify, assess, prioritize and monitor sustainability-related risks. (b) the processes the entity uses to identify, assess, prioritize and monitor sustainability-related opportunities; and (c) the extent to which, and how, the processes for identifying, assessing, prioritizing and monitoring sustainability-related risks and opportunities are integrated into and inform the entity's overall risk management process.	**Section 6** Materiality Assessment

Table 11-1 IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (*Cont.*)

Topic	IFRS Index	Requirements	Location in Report
Metrics and Targets	IFRS S1.45	The objective of sustainability-related financial disclosures on metrics and targets is to enable users of general-purpose financial reports to understand an entity's performance in relation to its sustainability-related risks and opportunities, including progress towards any targets the entity has set, and any targets it is required to meet by law or regulation.	Requirement Objective – no disclosure requirement
	IFRS S1.47	In the absence of an IFRS Sustainability Disclosure Standard that specifically applies to a sustainability-related risk or opportunity, an entity shall apply paragraphs 57–58 to identify applicable metrics.	Additional guidance – no disclosure requirement

Table 11-2 IFRS S2 Climate-related Disclosure

Topic	IFRS Indices	Requirements	Location in Report
Governance	IFRS S2.5	The objective of climate-related financial disclosures on governance is to enable users of general-purpose financial reports to understand the governance processes, controls and procedures an entity uses to monitor, manage and oversee climate-related risks and opportunities.	Requirement Objective – no disclosure requirement
	IFRS S2.6	To achieve this objective, an entity shall disclose information about: (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. (b) management's role in the governance processes, controls and procedures used to monitor, manage and oversee climate-related risks and opportunities.	**Section 7.1** Climate Governance Structure
	IFRS S2.7	In preparing disclosures to fulfil the requirements in paragraph 6, an entity shall avoid unnecessary duplication in accordance with IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (IFRS S1).	Additional guidance – no disclosure requirement
Strategy	IFRS S2.8	The objective of climate-related financial disclosures on strategy is to enable users of general-purpose financial reports to understand an entity's strategy for managing climate-related risks and opportunities.	Requirement Objective – no disclosure requirement
	IFRS S2.9	Specifically, an entity shall disclose information to enable users of general-purpose financial reports to understand: (a) the climate-related risks and opportunities that could reasonably be expected to affect the entity's prospects; (b) the current and anticipated effects of those climate-related risks and opportunities on the entity's business model and value chain; (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; (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; and (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.	**Section 8** Strategy

Table 11-2 IFRS S2 Climate-related Disclosure (*Cont.*)

Topic	IFRS Indices	Requirements	Location in Report
Strategy (*Cont.*)	IFRS S2.10	An entity shall disclose information that enables users of general-purpose financial reports to understand the climate-related risks and opportunities that could reasonably be expected to affect the entity's prospects. Specifically, the entity shall: (a) describe climate-related risks and opportunities that could reasonably be expected to affect the entity's prospects; (b) explain, for each climate-related risk the entity has identified, whether the entity considers the risk to be a climate-related physical risk or climate-related transition risk; (c) specify, for each climate-related risk and opportunity the entity has identified, over which time horizons—short, medium or long term— the effects of each climate-related risk and opportunity could reasonably be expected to occur; and (d) explain how the entity defines 'short term', 'medium term' and 'long term' and how these definitions are linked to the planning horizons used by the entity for strategic decision-making.	**Section 8.1** Climate-related Risks and Opportunities
	IFRS S2.11	In identifying the climate-related risks and opportunities that could reasonably be expected to affect an entity's prospects, the entity shall use all reasonable and supportable information that is available to the entity at the reporting date without undue cost or effort, including information about past events, current conditions and forecasts of future conditions.	Additional guidance – no disclosure requirement
	IFRS S2.12	In identifying the climate-related risks and opportunities that could reasonably be expected to affect an entity's prospects, the entity shall refer to and consider the applicability of the industry-based disclosure topics defined in the industry-based Guidance on Implementing IFRS S2.	Additional guidance – no disclosure requirement
	IFRS S2.13	An entity shall disclose information that enables users of general-purpose financial reports to understand the current and anticipated effects of climate-related risks and opportunities on the entity's business model and value chain. Specifically, the entity shall disclose: (a) a description of the current and anticipated effects of climate-related risks and opportunities on the entity's business model and value chain; and (b) a description of where in the entity's business model and value chain climate-related risks and opportunities are concentrated (for example, geographical areas, facilities and types of assets).	**Section 8.1** Climate-related Risks and Opportunities

Table 11-2 IFRS S2 Climate-related Disclosure (*Cont.*)

Topic	IFRS Indices	Requirements	Location in Report
Strategy (*Cont.*)	IFRS S2.14	An entity shall disclose information that enables users of general-purpose financial reports to understand the effects of climate-related risks and opportunities on its strategy and decision-making. Specifically, the entity shall disclose: (a) information about how the entity has responded to, and plans to respond to, climate-related risks and opportunities in its strategy and decision-making, including how the entity plans to achieve any climate-related targets it has set and any targets it is required to meet by law or regulation. (b) information about how the entity is resourcing, and plans to resource, the activities disclosed in accordance with paragraph 14(a). (c) quantitative and qualitative information about the progress of plans disclosed in previous reporting periods in accordance with paragraph 14(a)	**Section 8.2** Climate Strategy and Resilience
	IFRS S2.15	An entity shall disclose information that enables users of general-purpose financial reports to understand: (a) the effects of climate-related risks and opportunities on the entity's financial position, financial performance and cash flows for the reporting period (current financial effects); and (b) the anticipated effects of climate-related risks and opportunities on the entity's financial position, financial performance and cash flows over the short, medium and long term, taking into consideration how climate-related risks and opportunities are included in the entity's financial planning (anticipated financial effects).	**Section 8.5** Climate-related Risks and Opportunities Effects on Financial Position, Financial Performance, and Cash Flows
	IFRS S2.16	Specifically, an entity shall disclose quantitative and qualitative information about: (a) how climate-related risks and opportunities have affected its financial position, financial performance and cash flows for the reporting period; (b) (b) the climate-related risks and opportunities identified in paragraph 16(a) for which there is a significant risk of a material adjustment within the next annual reporting period to the carrying amounts of assets and liabilities reported in the related financial statements; (c) how the entity expects its financial position to change over the short, medium and long term, given its strategy to manage climate-related risks and opportunities; (d) how the entity expects its financial performance and cash flows to change over the short, medium and long term, given its strategy to manage climate-related risks and opportunities (for example, increased revenue from products and services aligned with a lower-carbon economy; costs arising from physical damage to assets from climate events; and expenses associated with climate adaptation or mitigation).	**Section 8.5** Climate-related Risks and Opportunities Effects on Financial Position, Financial Performance, and Cash Flows

Table 11-2 IFRS S2 Climate-related Disclosure (*Cont.*)

Topic	IFRS Indices	Requirements	Location in Report
Strategy (*Cont.*)	IFRS S2.17	In providing quantitative information, an entity may disclose a single amount or a range.	**Section 8.5** Climate-related Risks and Opportunities Effects on Financial Position, Financial Performance, and Cash Flows
	IFRS S2.18	In preparing disclosures about the anticipated financial effects of a climate-related risk or opportunity, an entity shall: (a) use all reasonable and supportable information that is available to the entity at the reporting date without undue cost or effort; and (b) use an approach that is commensurate with the skills, capabilities and resources that are available to the entity for preparing those disclosures.	Additional guidance – no disclosure requirement
	IFRS S2.19	An entity need not provide quantitative information about the current or anticipated financial effects of a climate-related risk or opportunity if the entity determines that: (a) those effects are not separately identifiable; or (b) the level of measurement uncertainty involved in estimating those effects is so high that the resulting quantitative information would not be useful.	Additional guidance – no disclosure requirement
	IFRS S2.20	In addition, an entity need not provide quantitative information about the anticipated financial effects of a climate-related risk or opportunity if the entity does not have the skills, capabilities or resources to provide that quantitative information.	Additional guidance – no disclosure requirement
	IFRS S2.21	If an entity determines that it need not provide quantitative information about the current or anticipated financial effects of a climate-related risk or opportunity applying the criteria set out in paragraphs 19–20, the entity shall: (a) explain why it has not provided quantitative information; (b) provide qualitative information about those financial effects, including identifying line items, totals and subtotals within the related financial statements that are likely to be affected, or have been affected, by that climate-related risk or opportunity; and (c) provide quantitative information about the combined financial effects of that climate-related risk or opportunity with other climate-related risks or opportunities and other factors unless the entity determines that quantitative information about the combined financial effects would not be useful.	Additional guidance – no disclosure requirement

Table 11-2 IFRS S2 Climate-related Disclosure (*Cont.*)

Topic	IFRS Indices	Requirements	Location in Report
Strategy (*Cont.*)	IFRS S2.22	An entity shall disclose information that enables users of general-purpose financial reports to understand the resilience of the entity's strategy and business model to climate-related changes, developments and uncertainties, taking into consideration the entity's identified climate-related risks and opportunities. The entity shall use climate-related scenario analysis to assess its climate resilience using an approach that is commensurate with the entity's circumstances. In providing quantitative information, the entity may disclose a single amount or a range. Specifically, the entity shall disclose: (a) the entity's assessment of its climate resilience as at the reporting date. (b) how and when the climate-related scenario analysis was carried out. (c) information about the inputs the entity used. (d) the key assumptions the entity made in the analysis. (e) the reporting period in which the climate-related scenario analysis was carried out.	**Section 8.2** Climate Strategy and Resilience
	IFRS S2.23	In preparing disclosures to meet the requirements in paragraphs 13–22, an entity shall refer to and consider the applicability of cross-industry metric categories, as described in paragraph 29, and industry-based metrics associated with disclosure topics defined in the Industry-based Guidance on Implementing IFRS S2 as described in paragraph 32.	Additional guidance – no disclosure requirement
Risk Management	IFRS S2.24	The objective of climate-related financial disclosures on risk management is to enable users of general-purpose financial reports to understand an entity's processes to identify, assess, prioritize and monitor climate-related risks and opportunities, including whether and how those processes are integrated into and inform the entity's overall risk management process.	Requirement Objective – no disclosure requirement
	IFRS S2.25	To achieve this objective, an entity shall disclose information about: (a) the processes and related policies the entity uses to identify, assess, prioritize and monitor climate-related risks; (b) the processes the entity uses to identify, assess, prioritize 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 (c) the extent to which, and how, the processes for identifying, assessing, prioritizing and monitoring climate-related risks and opportunities are integrated into and inform the entity's overall risk management process.	**Section 9.1** Overview of Climate-related Risks and Opportunities Assessment

Table 11-2 IFRS S2 Climate-related Disclosure (*Cont.*)

Topic	IFRS Indices	Requirements	Location in Report
Metrics and Targets	IFRS S2.26	In preparing disclosures to fulfil the requirements in paragraph 25, an entity shall avoid unnecessary duplication in accordance with IFRS S1 (see paragraph B42(b) of IFRS S1).	Additional guidance – no disclosure requirement
	IFRS S2.27	The objective of climate-related financial disclosures on metrics and targets is to enable users of general-purpose financial reports to understand an entity's performance in relation to its climate-related risks and opportunities, including progress towards any climate-related targets it has set, and any targets it is required to meet by law or regulation.	Requirement Objective – no disclosure requirement
	IFRS S2.28	To achieve this objective, an entity shall disclose: (a) information relevant to the cross-industry metric categories; (b) industry-based metrics that are associated with particular business models, activities or other common features that characterize participation in an industry; and (c) targets set by the entity, and any targets it is required to meet by law or regulation, to mitigate or adapt to climate-related risks or take advantage of climate-related opportunities, including metrics used by the governance body or management to measure progress towards these targets.	**Section 10.2.1** Cross-industry Metrics
	IFRS S2.29	An entity shall disclose information relevant to the cross-industry metric categories of: (a) greenhouse gases; (b) climate-related transition risks—the amount and percentage of assets or business activities vulnerable to climate-related transition risks; (c) climate-related physical risks—the amount and percentage of assets or business activities vulnerable to climate-related physical risks; (d) climate-related opportunities—the amount and percentage of assets or business activities aligned with climate-related opportunities; (e) capital deployment—the amount of capital expenditure, financing or investment deployed towards climate-related risks and opportunities; (f) internal carbon prices; (g) remuneration.	**Section 10.2.1** Cross-industry Metrics
	IFRS S2.30	In preparing disclosures to meet the requirements in paragraph 29(b)–(d), an entity shall use all reasonable and supportable information that is available to the entity at the reporting date without undue cost or effort.	Additional guidance – no disclosure requirement

Table 11-2 IFRS S2 Climate-related Disclosure (*Cont.*)

Topic	IFRS Indices	Requirements	Location in Report
Metrics and Targets (*Cont.*)	IFRS S2.31	In preparing disclosures to meet the requirements in paragraph 29(b)–(g), an entity shall refer to paragraphs B64–B65.	Additional guidance – no disclosure requirement
	IFRS S2.32	An entity shall disclose industry-based metrics that are associated with one or more particular business models, activities or other common features that characterize participation in an industry. In determining the industry-based metrics that the entity discloses, the entity shall refer to and consider the applicability of the industry-based metrics associated with disclosure topics described in the Industry-based Guidance on Implementing IFRS S2.	**Section 10.2.2** Industry-based Metrics
	IFRS S2.33	An entity shall disclose the quantitative and qualitative climate-related targets it has set to monitor progress towards achieving its strategic goals, and any targets it is required to meet by law or regulation, including any greenhouse gas emissions targets. For each target, the entity shall disclose: (a) the metric used to set the target; (b) the objective of the target (for example, mitigation, adaptation or conformance with science-based initiatives); (c) the part of the entity to which the target applies (for example, whether the target applies to the entity in its entirety or only a part of the entity, such as a specific business unit or specific geographical region); (d) the period over which the target applies; (e) the base period from which progress is measured; (f) any milestones and interim targets; (g) if the target is quantitative, whether it is an absolute target or an intensity target; and (h) how the latest international agreement on climate change, including jurisdictional commitments that arise from that agreement, has informed the target.	**Section 10.1** Climate-related Targets
	IFRS S2.34	An entity shall disclose information about its approach to setting and reviewing each target, and how it monitors progress against each target, including: (a) whether the target and the methodology for setting the target has been validated by a third party; (b) the entity's processes for reviewing the target; (c) the metrics used to monitor progress towards reaching the target; and (d) any revisions to the target and an explanation for those revisions.	**Section 10.1** Climate-related Targets

Table 11-2 IFRS S2 Climate-related Disclosure (*Cont.*)

Topic	IFRS Indices	Requirements	Location in Report
Metrics and Targets (*Cont.*)	IFRS S2.35	An entity shall disclose information about its performance against each climate-related target and an analysis of trends or changes in the entity's performance.	Additional guidance – no disclosure requirement
	IFRS S2.36	For each greenhouse gas emissions target disclosed in accordance with paragraphs 33–35, an entity shall disclose: (a) which greenhouse gases are covered by the target. (b) whether Scope 1, Scope 2 or Scope 3 greenhouse gas emissions are covered by the target. (c) whether the target is a gross greenhouse gas emissions target or net greenhouse gas emissions target. If the entity discloses a net greenhouse gas emissions target, the entity is also required to separately disclose its associated gross greenhouse gas emissions target (d) whether the target was derived using a sectoral decarbonization approach. (e) the entity's planned use of carbon credits to offset greenhouse gas emissions to achieve any net greenhouse gas emissions target.	**Section 10.2.1** Cross-industry Metrics
	IFRS S2.37	In identifying and disclosing the metrics used to set and monitor progress towards reaching a target described in paragraphs 33–34, an entity shall refer to and consider the applicability of cross-industry metrics and industry-based metrics, including those described in an applicable IFRS Sustainability Disclosure Standard, or metrics that otherwise satisfy the requirements in IFRS S1.	**Section 10.1** Climate-related Targets **Section 10.2** Climate-related Metrics

PTT GLOBAL CHEMICAL PUBLIC COMPANY LIMITED
555/1 Energy Complex, Building A, 18th Floor,
Vibhavadi Rangsit Road, Chatuchak, Chatuchak, Bangkok 10900 Thailand.
Tel: 66 (0) 2265-8400 Fax: 66 (0) 2265-8500

บริษัท พีทีที โกลบอล เคมิคอล จำกัด (มหาชน)
เลขที่ 555/1 ศูนย์เอนเนอร์ยี่คอมเพล็กซ์ อาคารเอ ชั้น 18
ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10900
โทรศัพท์:66 (O) 2265-8400 โทรสาร : 66 (0) 2265-8500

www.pttgcgroup.com